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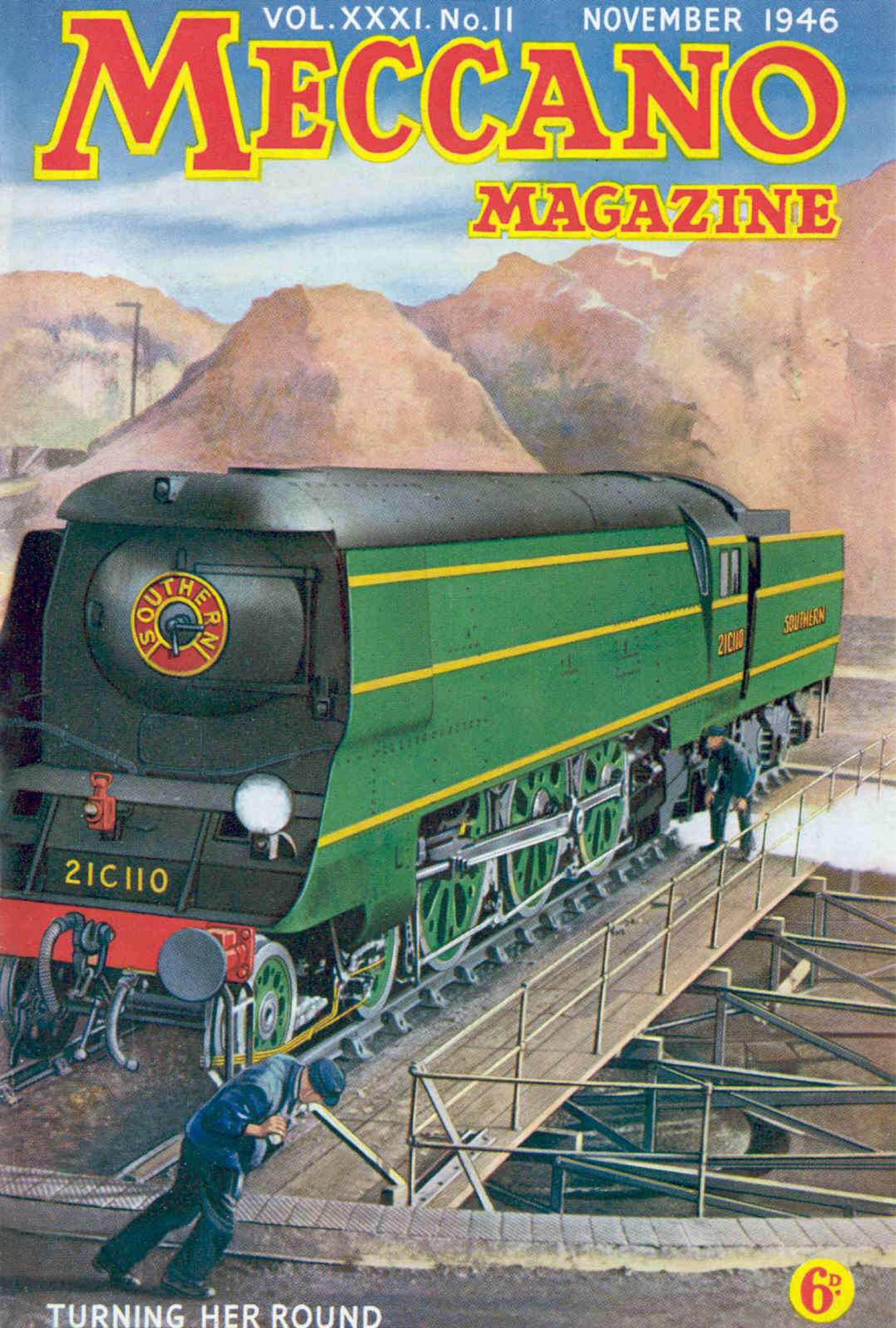
MECCANO MAGAZINE



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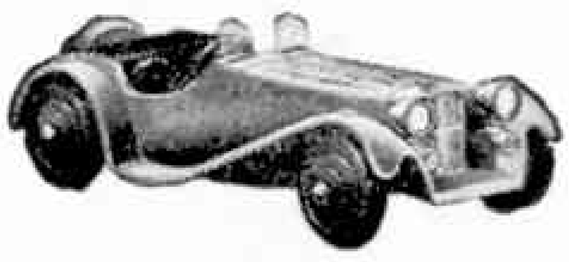

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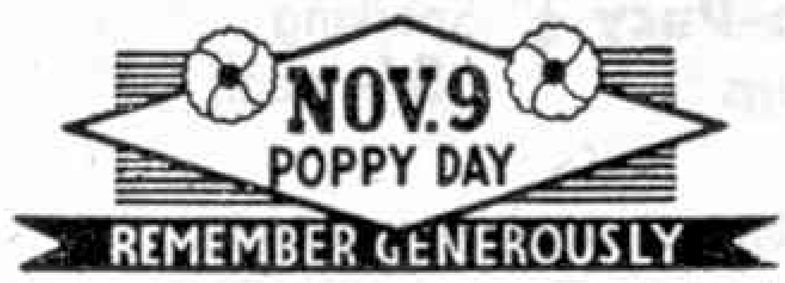

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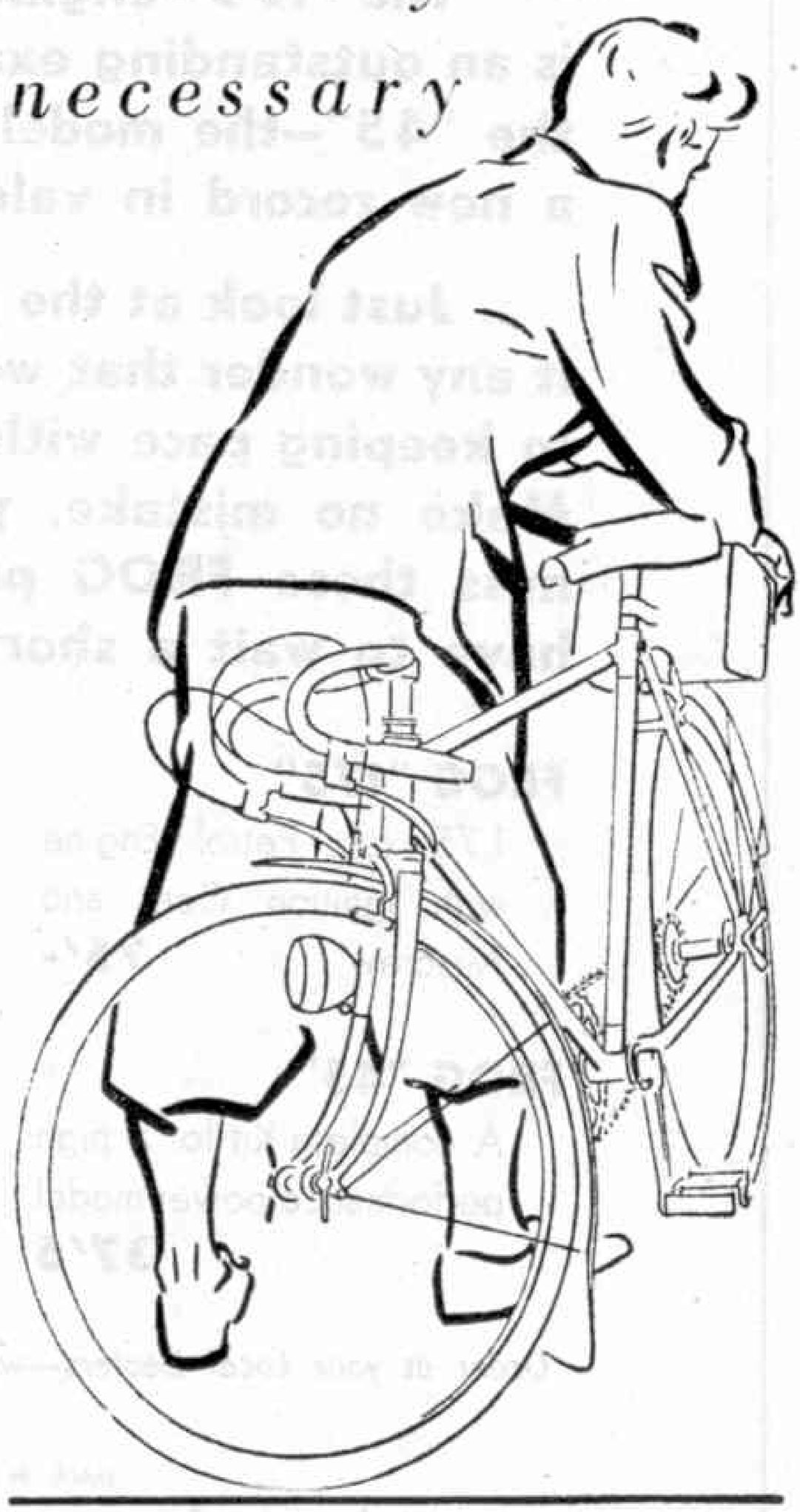

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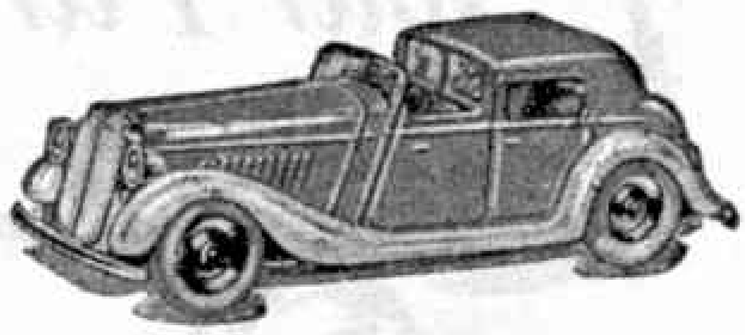

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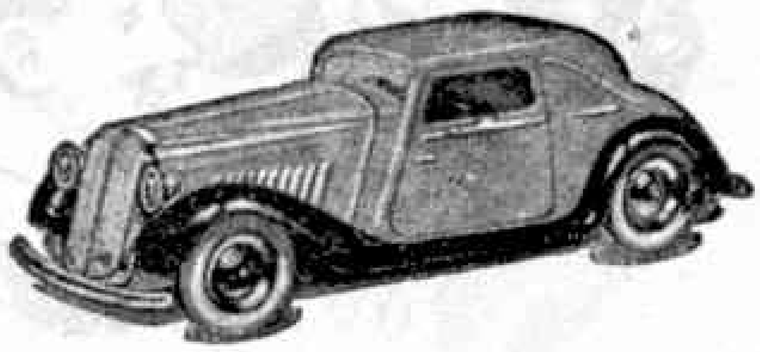

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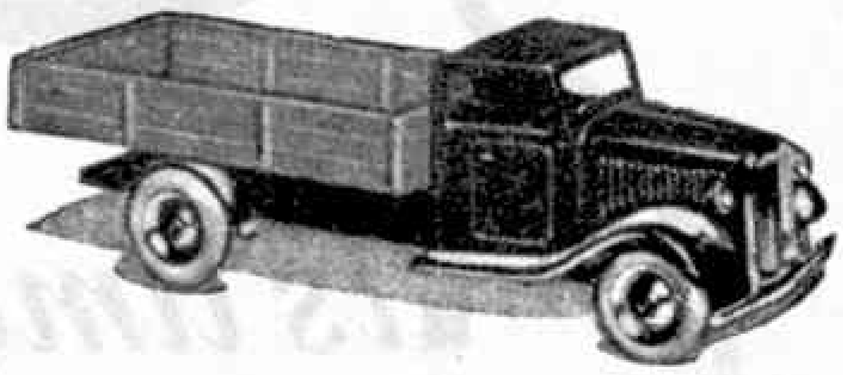

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MECCANO MAGAZINE

Editorial Office:
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November 1946

With the Editor

Geoffrey de Havilland

At some time in our lives most of us have dreamed of becoming a test pilot, flashing through the skies in fast beautiful aeroplanes, feeling and being really on top of the world. For Geoffrey Raoul de Havilland that boyhood dream came true and, if he had lived a little longer, he would almost certainly have become the first man in the world to fly at over 1,000 kilometres an hour in level flight.

As the son of Sir Geoffrey de Havilland, it is not surprising that "young Geoffrey" loved flying. But he had to gain his wings the hard way, and not until after four years as an apprentice in the de Havilland Technical School did he find time for much flying. Then he first became flying instructor to the school, and in 1934 began to help with some test flying. In 1937 he took over the duties of chief test pilot, and during the war piloted both the "Mosquito" and the "Vampire" on their first flights.

With the return of peace young Geoffrey and the "Vampire" thrilled the crowds at every flying display in the country, with the most perfect high-speed aerobatic displays ever seen. On 13th September he gave his last and greatest show at Radlett, in the little tailless "Swallow" . . . . . Fourteen days later, during practice for an attempt on the world's air speed record, the "Swallow" broke up in mid-air and Geoffrey de Havilland was killed.

It is difficult to feel merely a sense of grief and loss at his death, for flying was his life-blood and he died in a moment when his happiness must have been complete. He had many of the qualities that make up the traditional Englishman—love of adventure, achievement, and the freedom that can be found in the skies. He had also the qualities of a great pilot, for he was fearless without being reckless, precise and clear-thinking. He will not be forgotten in the days ahead, when flying is as safe as travel by road or rail because men like Geoffrey de Havilland dared and died.

Apology to Boys' Brigade

I have to apologise to the Boys' Brigade for a very unfortunate slip made in last month's *"M.M."* by the writer of the article :*"Overhauling the Forth Bridge."* He said that the privileged few who crossed the bridge on foot included two Boy Scouts carrying a message that travelled in relays from John o' Groats to London on the occasion of the Silver Jubilee of 1935. Actually it was three members of the Boys' Brigade who made this historic crossing, which was part of a great scheme in which relays of messengers, starting from Londonderry, Neath, Penzance and Lowestoft, as well as John o' Groats, carried five messages to London for presentation to the King on Jubilee Day.

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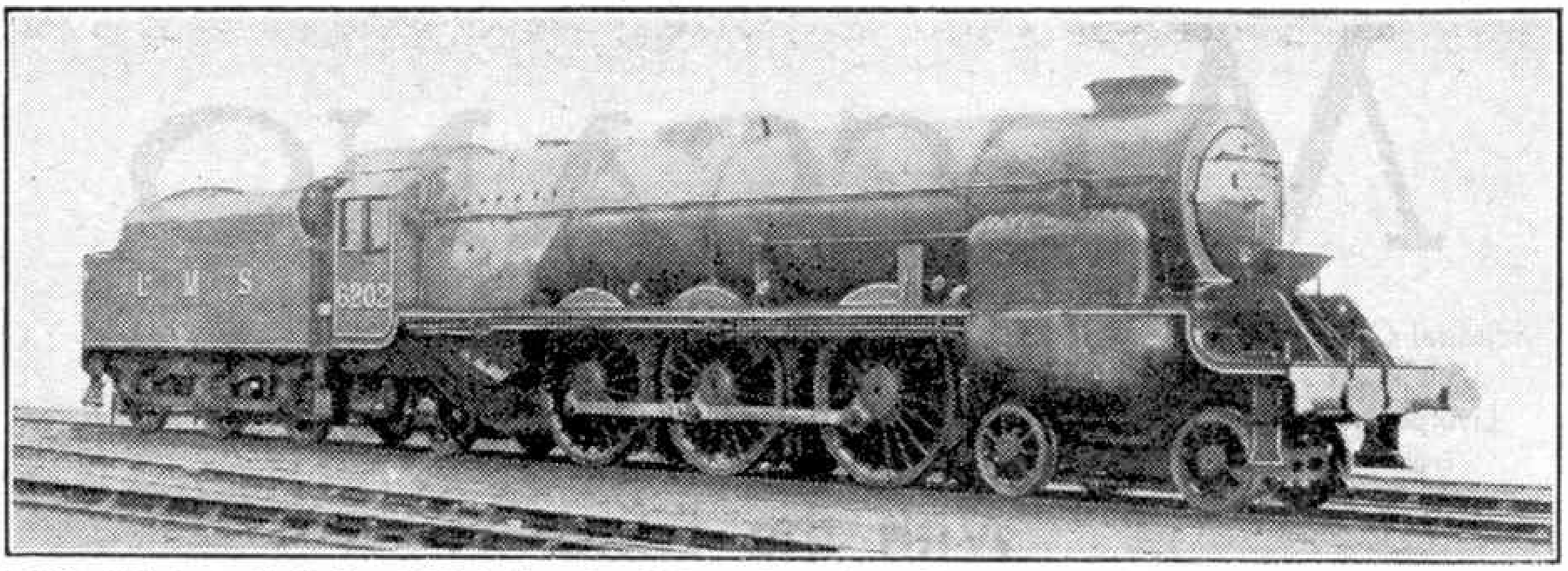


L.M.S. "Turbomotive" No. 6202 before the fitting of smoke deflectors. This illustration shows the external arrangement of the right-hand side of the engine. Photograph by courtesy of the L.M.S.

Footplate Trip on the "*Turbomotive*"

I—Lime Street to Crewe

By "North Western"

"*COME early,*" said the District Locomotive Superintendent, *"then you can see something of the preparation of the engine for the up run."* Nothing loth, I did as suggested; for I had been charged by the Editor of the "*M.M.*" with the pleasant task of making, by courtesy of the L.M.S. authorities, the return journey between Liverpool and London on the footplate of the L.M.S. "*Turbomotive*" No. 6202, the only engine of its kind in British practice. It was in fact the only one of its particular kind in the world until the appearance last year of the Pennsylvania Railroad 6–8–6 turbine locomotive referred to in the January 1946 "*M.M.*".

No. 6202 at the head of an up express about to take the London line at Edge Hill. Photograph by the Rev. E. Treacy.

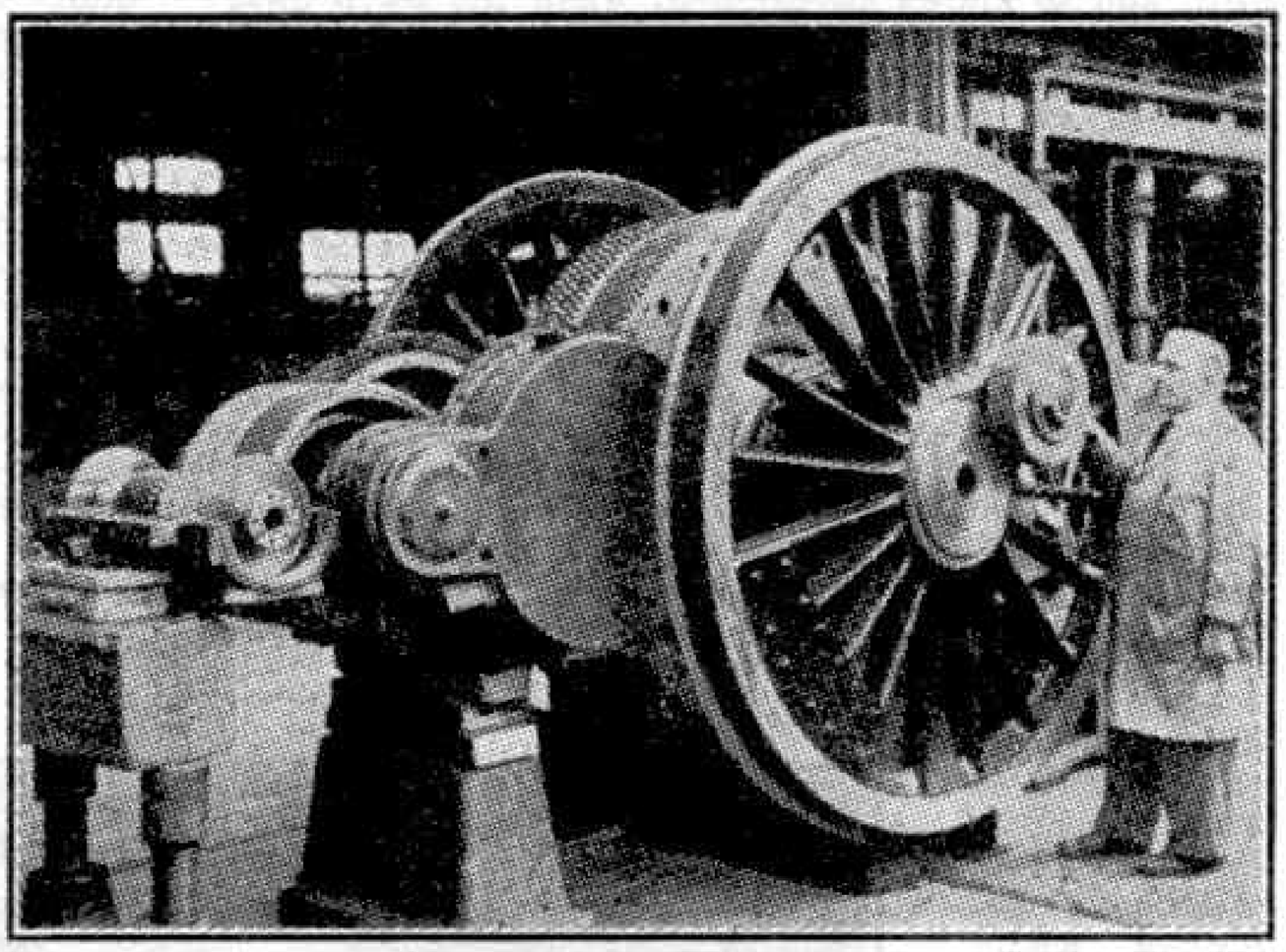
So, one autumn afternoon, armed with the necessary footplate pass, I presented myself at the office of Edge Hill Motive Power Depot. "My" engine had not yet come round on to the shed, so while waiting I was given some details of the working arrangements of No. 6202 and her various crews. The "Turbo," as she is often called, belongs to Camden, and her normal working had for some time been to work down on the 8.30 a.m. from Euston to Liverpool, a heavy train with several stops; then, after servicing at Edge Hill, she takes back the 5.25 p.m. from Lime Street, stopping at Crewe only, the train often referred to in pre-war days as the "*Liverpool Flier*" though it did not carry this title. This is quite a strenuous daily turn involving a total of some 400 miles when train disposal and light engine movements to and from sheds are included.

Although the engine thus makes the double trip in one day, the enginemen do not, as they take a specified period of rest after each trip. Thus the crew with whom I was to travel up had come down to Liverpool the night before, "booking off" in the early morning and being due on duty again at 4 p.m. But the engine they brought down had already gone back to

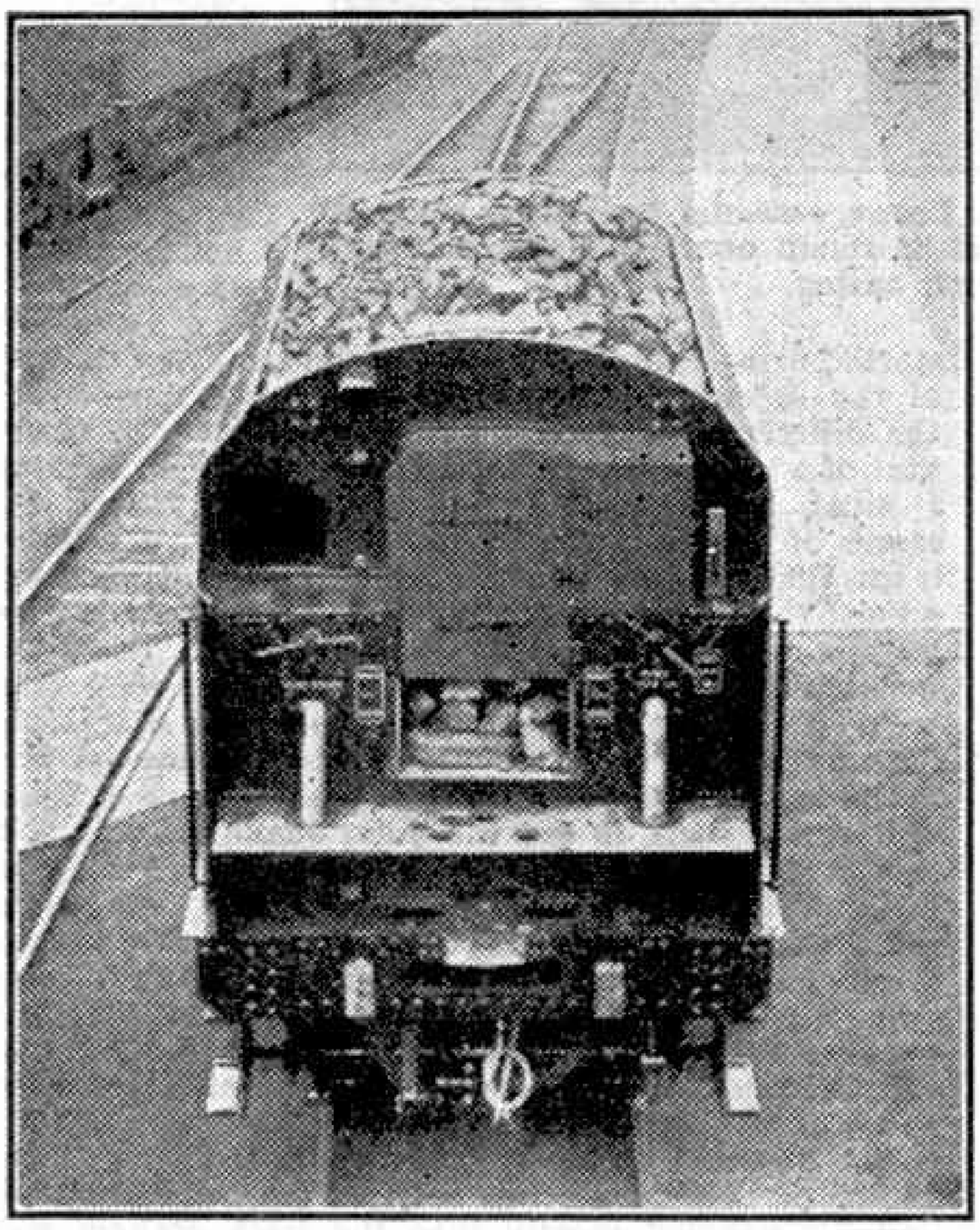
London that morning on the 10 a.m. from Lime Street. At one time the men did do the double trip in a day, but with the introduction of the eight-hour day system these long turns became a thing of the past.

When No. 6202 had come round I was taken along to her, and it seemed unusual nowadays for such a big engine to have no outside cylinders and motion, the coupling rods being the only visible moving parts. She was standing undergoing the various ministrations necessary between one journey and another. Driver J. Worman and his mate Fireman E. Robinson, both Camden men, were already busy; the one oiling round and the other superintending operations connected with his part of the job. The fire had been cleaned, a hot and dirty task, and made up so that we should have plenty of fire and a good head of steam by starting time; and the footplate was hosed down and fittings generally tidied up. A Fitter attached to the Chief Mechanical Engineer's Dept. always travels with this engine, and Fitter F. Broach of Crewe, who has been on this job for some time, immediately appointed himself my guide, philosopher and friend for the journey; so that I felt as if I "belonged" to the crew right away.

Preparations being complete, we moved away from the pits, and over the tricky layout of the locomotive depot premises I had the opportunity of seeing how readily manœuvred is No. 6202 in spite of her unorthodox design. Driver Worman, whose service dates from 1897, was one of the first enginemen to handle No. 6202, and his complete mastery of the engine made the job seem simple.



The driving wheels of the "Turbo" with reduction gearing laid out as mounted in the engine. This and the photograph on the next page are reproduced by courtesy of the L.M.S.



A 4,000 gallon tender as provided behind No. 6202. This illustration gives a good idea of the tender footplate arrangements.

It will be as well at this point to say something of the layout of the power unit and transmission of No. 6202. In place of the four-cylinder reciprocating type of steam engine adopted for all the other L.M.S. 4–6–2s power is provided by a 2,000 h.p. non-condensing steam turbine with reduction gear transmission to the coupled wheels.

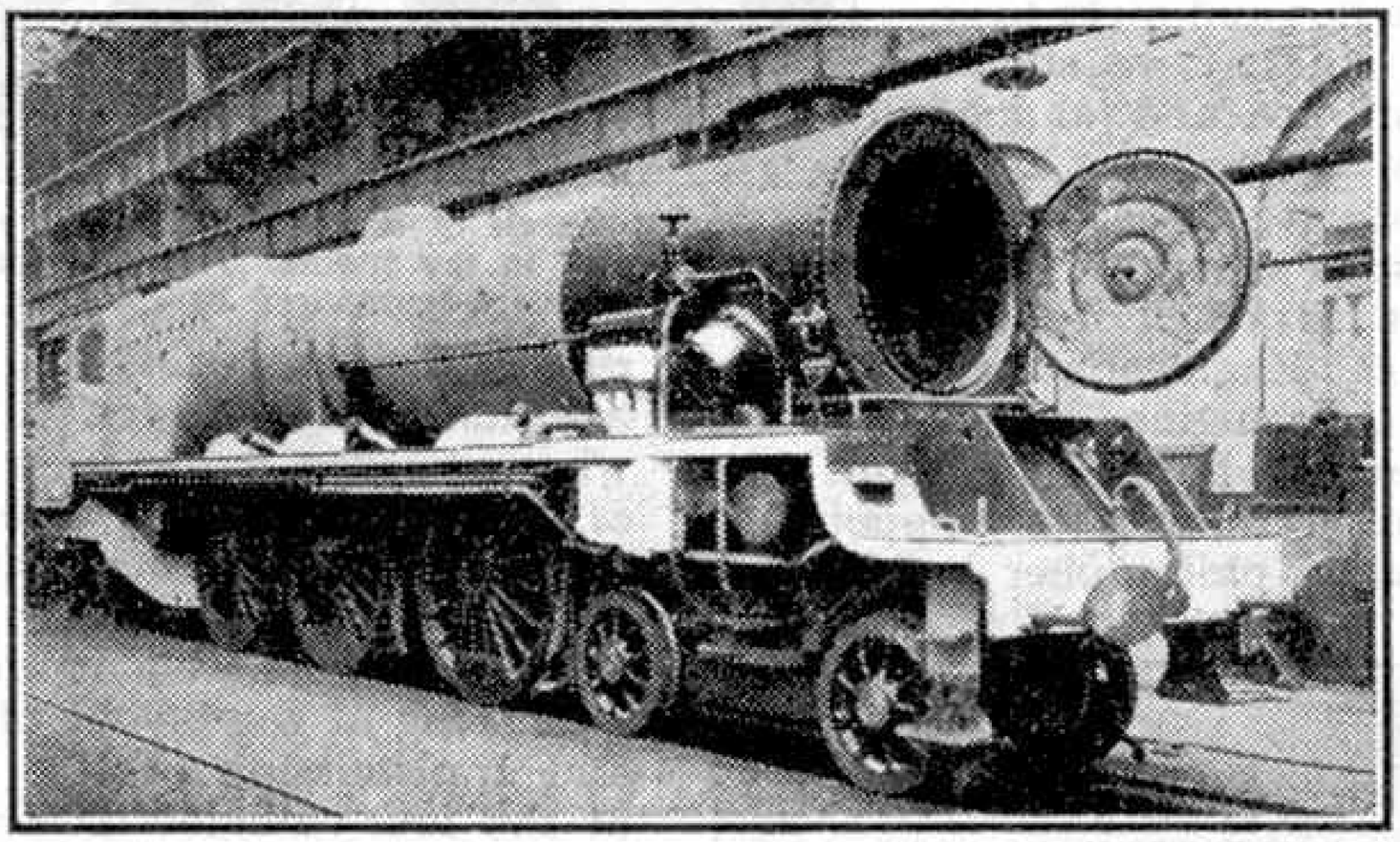
For forward working a multi-stage turbine is fitted on the left-hand side of the engine frame and this accounts for the rather mysterious-looking casing that appears above the bogie. The reduction gear, clearly shown in one of the accompanying photographs, is of the double helical type, and is completely enclosed. For reverse running a separate smaller turbine, also in a casing, is provided on the right-hand side of the engine and there is, for reversing, an additional single reduction gear.

The forward turbine is permanently connected through to the transmission gear. When the reverse turbine is in operation the steam supply to the forward turbine is cut off and the drive from the reverse turbine is engaged. This can only

be achieved when the engine s stationary, a safety device being incorporated in the transmission to prevent the change being made while the engine is in motion. When the drive from the reverse turbine has been engaged, the steam supply to this unit can then be opened and when the engine is running tender first the forward turbine blades move in the reverse direction. There is also a special "inching gear" that gives the reversing shaft half-a-tooth turn, and so allows engagement when the teeth have stopped opposite one another.

The steam supply is taken first through the main regulator on the boiler which is kept fully open while the engine is in motion, and then to regulators on the nozzles of the two turbines, there being six for the forward turbine, and three for the reverse. These are operated from the control box in the cab, and by means of inter-locking devices between the reversing clutch mechanism and the turbine regulator it is impossible to admit steam to the forward turbine when the reverse turbine is in gear, or vice versa. The control box occupies practically the same position in the cab as the screw-reverse of a normal steam locomotive, immediately in front of the driver. It has a sliding indicator showing whether forward or reverse gear is engaged and also the number of nozzles in use.

Mechanical lubrication for the turbines and transmission gears is looked after by a submerged pump in an oil well at the rear end of the gear casing. The characteristic "radiator" between the frame plates at the front of the engine provides for the cooling of the circulating oil. Oil pressure is recorded on gauges in the cab.



No. 6202, when under construction at Crewe, showing insulating material applied outside the reverse turbine and its steam nozzles before the fitting of the external casing.

So we made our way to the coaling plant—one of the earliest fuel plants in this country, and one that has been in use for quite 30 years although modernised in the meantime—and the coal supply was quickly made up. Back again now to the head of the yard where a "Black Stanier," in other words a Class 5 4–6–0, was waiting to accompany us down to Lime Street.

We were due off the shed at 4.50 p.m. so with the Class 5 leading and thus virtually in charge of us we drifted out on to the main line to that sort of "hole in the wall," as it looks from passing trains, by which engines leave the shed premises. We coasted backward through Edge Hill Station and down the cavernous slope by which the line goes down to Lime Street, through a cutting with sheer and grimy sides of red sandstone, remarkably deep and intersected by bridges and short tunnels carrying the streets and property above.

The "Turbo" ran easily and quietly, for she has roller-bearing axle-boxes throughout, the only noise I could discern being the rumble of the wheels on rails, punctuated by the impact of the rail joints and occasionally a hiss from the driver's brake valve. We came down to Lime Street and after a little manœuvring backed on to our train standing at No. 7 Platform. Starting from Lime Street is not an easy job, as from No. 7 to the up main several crossovers have to be negotiated. At most terminals with engines standing or constantly passing in and out, the tracks are inclined to be greasy, and Lime Street is no exception. Driver Worman was taking no chances; before we left he filled the spare shovel with sand and walked ahead literally "hand-sanding" the rails over which we were to pass.

Looking back from track level to where our train was standing it was striking to notice how even the giant 6202, an engine built practically to the limits of the British loading gauge, was completely dwarfed by the lofty road bridge and high side walls at the start of the cutting leading out of the station. From the front end No. 6202 looked very businesslike, and was plainly eager to be off. Smoke was showing at the chimney, and the fire, brought into good shape by Robinson and urged by the blower, was causing the safety valves to hiss furiously. This "music" was quickly checked by putting the injector to work, and at this point the "sanding party" returned to the cab. I was installed on the fireman's seat on the right-hand side. A few last-moment touches, setting of dampers, adjustment of injector feed, breaking of coal and the inevitable hosing down, and Robinson leaned out behind me to catch the "*right away*," the station platform here being on the fireman's side.

Five-twenty-five and a shrilling of whistles on the platform; "*Right, Jack*," and almost imperceptibly with a blast from the engine's hooter we were off. We had, as the enginemen say, "13 on," one of these a 12-wheeler, and the tare weight of the train was 408 tons; probably about 435 tons with passengers and luggage. With three nozzles in use No. 6202 began to move this over on to the up main, and as she did so Robinson started firing. Almost at once began the stern business of the ascent to Edge Hill, and as we moved out, the difference between the working of No. 6202 and that of a locomotive of normal type was most striking. I must, I suppose, have seen and travelled with scores of engines out of Lime Street, and with heavy loads their mighty exhaust beats when getting away almost threaten to shake the walls of the grim canyon leading up to Edge Hill. Now, however, there was no puffing exhaust, no rhythmic clank of connecting rods; just a humming noise from the gears, and literally a roar from the fire as the continuous purr of the exhaust whipped it into a seething mass of flame.

I looked back to see the train snake its way over the crossovers behind us; with smoke and steam hanging low between the cutting walls and under the first few bridges we were more or less blanketed in gloom. No. 6202 ambled on up the bank without apparent effort under the influence of the three nozzles, and these continued in use until Edge Hill was reached. Over this strenuous stretch Robinson had put in three fires. The large fire hole on this engine guarded by two mighty doors hung on rollers, allows of careful placing of the fuel, which on my journey was fed mostly into the back corners with some down the sides of the grate. The demand for steam had knocked pressure down a bit, but after getting past Edge Hill Junction, (*Cont. on page 480*)

The Handley Page "Hermes"

By John W. R. Taylor

EVER since the first V/1500 bomber was modified to carry passengers in 1921, Handley Page have built the world's safest and most comfortable air liners.

During the war some 6,000 Handley Page "Halifax" bombers were built and they dropped 227,610 tons of bombs on the enemy. Now, with the return of some semblance of peace, all the skill and experience gained in building and operating these "Halifaxes" have gone into the task of creating a new and even better air liner to put Britain back in the forefront of world airline operators. That air liner is the "Hermes."

When the prototype "Hermes" crashed last December there was a fresh spate of ill-informed criticism of Britain's post-war air liners. But everyone familiar with the hazards that attend the first flight of any prototype, and particularly those who recognised the immense contribution Handley Page have made in the development of British air transport, knew that this accident was but part of the inevitable price that must always be paid for progress towards safer and cheaper air travel.

The second prototype flew for the first time on 7th May last and has come through a rigorous programme of test flights with flying colours. It differs from the first machine in that it is fitted out for military transport duties with the Royal Air Force, in which form it is known as the "Hastings." Except for the layout of their cabins, however, the "Hastings" and "Hermes" I are identical. Both are all-metal low wing monoplanes of 113 ft. span, and powered by four 1,675 h.p. Bristol "Hercules" 120 engines.

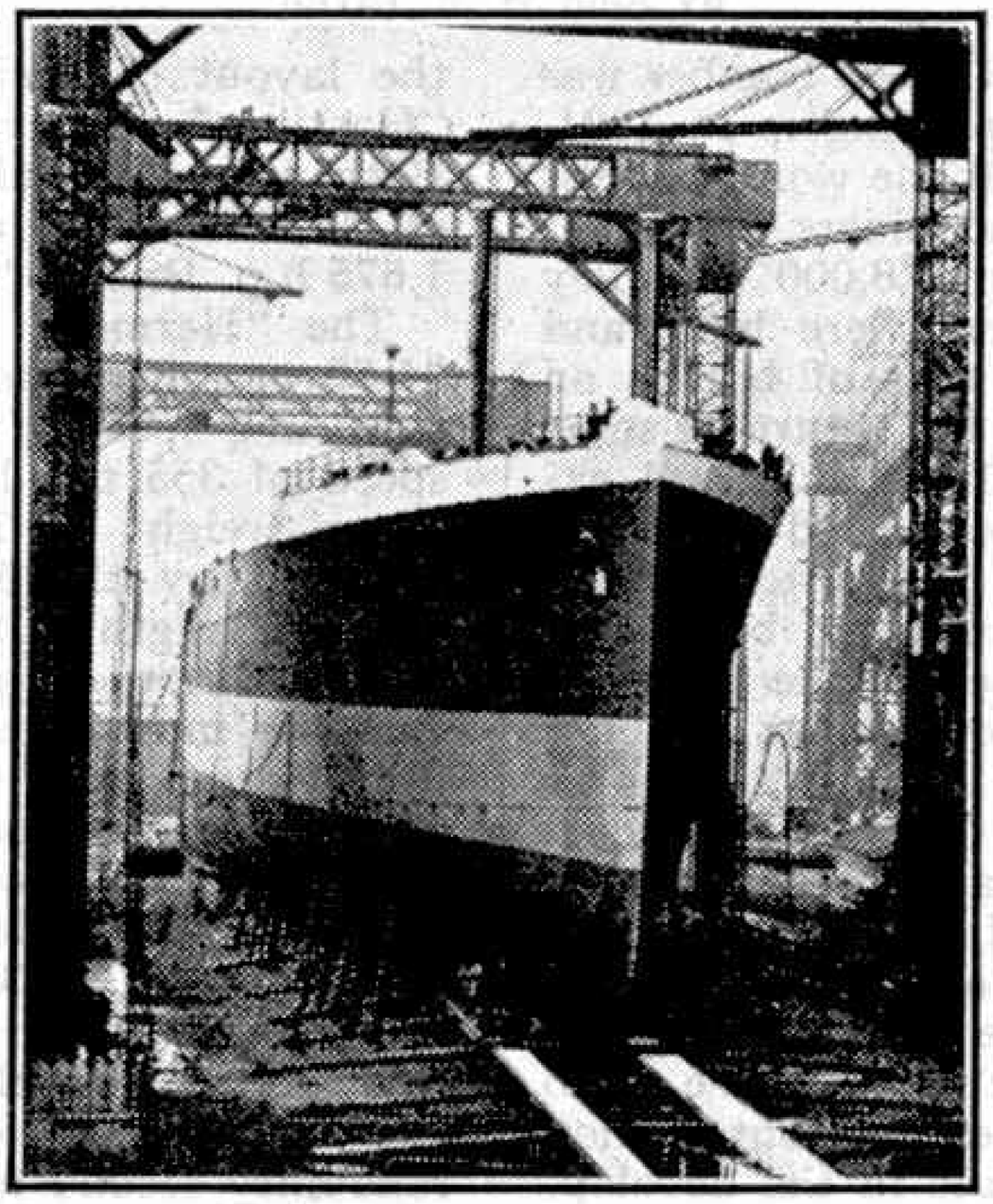
The "Hermes" I is designed to carry 34-50 passengers for up to 3,460 miles at a cruising speed of 300 m.p.h. It has a top speed of 355 m.p.h. at 22,700 ft. and an all-up weight of 75,000 lbs. It will be followed by the Mark II, in which the fuselage length will be increased by 13 ft. to 95 ft. 6 in. to accommodate 64 passengers. But the most interesting of the series is the "Hermes" III which will be similar in size and accommodation to the Mark II but will be powered by four Bristol "Theseus" propjets, which will give it a cruising speed of 355 m.p.h. and range of 2,740 miles. There seems little doubt that this version of the "Hermes" will set standards of performance, comfort and reliability second to no other four-engined air liner in the world.

The Handley Page "Hermes/Hastings" prototype aircraft, fully loaded, undergoing landing trials with its two starboard engines stopped. The top photograph shows the machine in flight.

Ship Repair and Salvage—II

By Denis Rebbeck, M.A., B.Litt., M.Inst.N.A., M.I.Mar.E.

IN the early hours of 30th November, 1927, the *"Lochmonar,"* inward bound to Liverpool with a full cargo from North Pacific ports, developed a sudden defect in her steering gear while sailing up the Mersey. The ship was in a narrow fairway and before those on the bridge could take any preventive measures she had overrun the sunken revetment at Taylors' Bank. It was impossible to refloat the vessel and the receding tide left her supported amidships on the wall with the after end unsupported over the channel. At 10.0 p.m. on 30th November the *"Lochmonar"* broke her back across the wall, the fracture being under No. 2 hold immediately forward of the bridge. The 'midships and stern portion of the vessel remained across the fairway and the Mersey Docks and Harbour Board, under the statutory powers they possess, took immediate steps to remove the obstruction.



The new bow for the M.V. "Lochmonar" ready for launching.

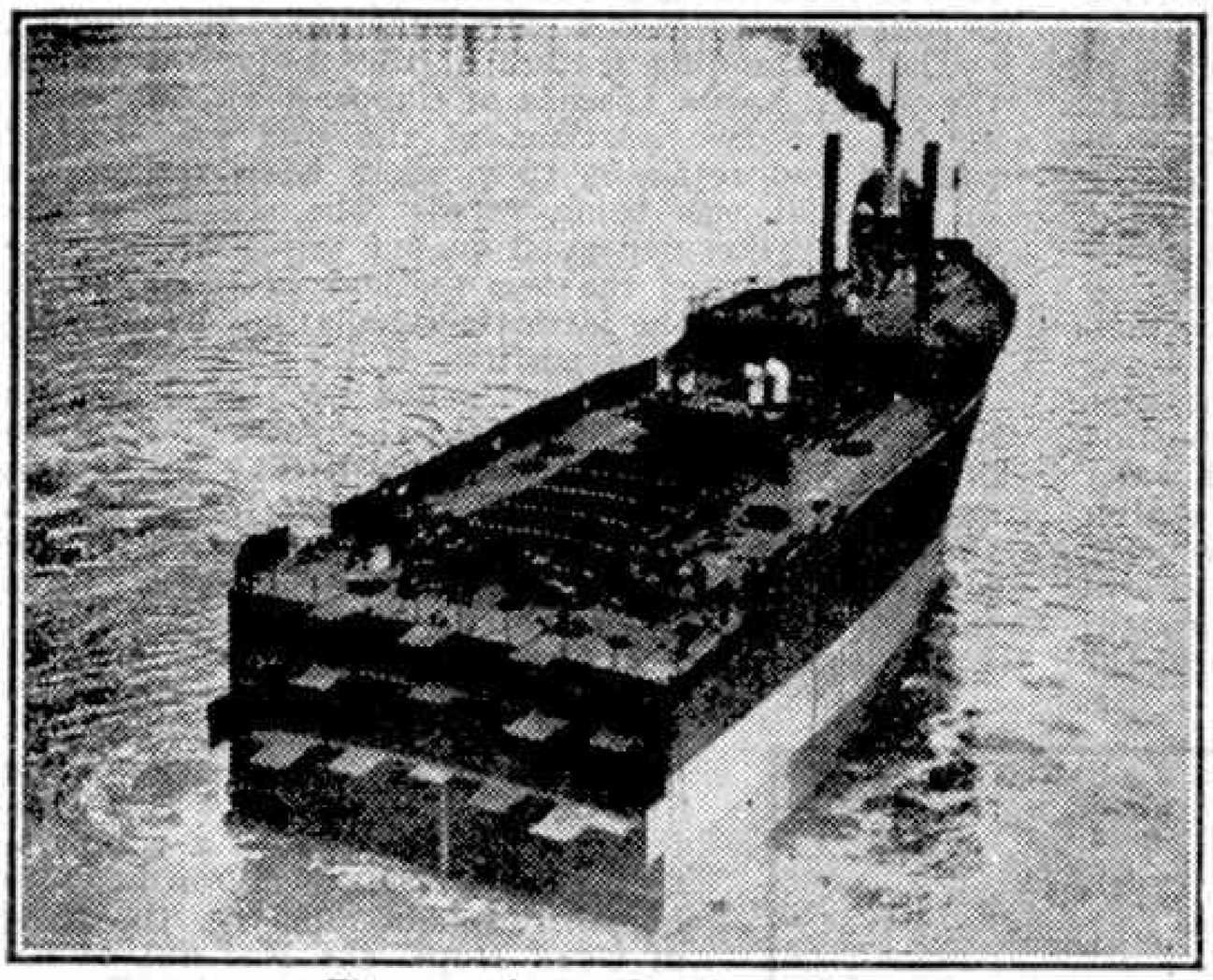
It was apparent to all concerned that there was no chance of salvaging the fore part of the vessel, which contained over a thousand tons of cargo, and so every effort was concentrated on saving the after portion which included the main propelling machinery and major part of the cargo. Everyone realised that if bad weather should blow up, the engine room bulkhead would batter on the wall, in which case the engine room would become flooded and the ship would sink. No. 2 hold and 'tween deck, in way of the fracture, was cleared of cargo, and divers cut through the decks and girder; this work could only be carried out at low water, as the rise of tide brought the jagged ends of the vessel together and made the work too dangerous for divers.

By Wednesday 8th December, after day and night cutting away, several charges of explosives were fired so as to finally sever the two parts of the hull. The following morning six tugs commenced to tow at right angles to the hull so as to break through the few remaining connections. Eventually the stern portion of the vessel began to move, the main engines were immediately started, and slowly the stern floated away clear of the wreck. The salved portion was towed to Liverpool where it was prepared for towing to Belfast.

Harland and Wolff Ltd. had, in the meantime, received an order to build a new fore part 177 ft. long. After much careful consideration, calculation and experiment, it was decided to build the new fore end on a slip, and not in a drydock, and to launch it stem first.

In due course all arrangements and plans were perfected and the keel was laid on 26th January and the completed fore end launched on 2nd August 1928. Our photographs show the new bow ready for launching, and then safely launched and in the charge of a tug which will tow it to the drydock. It will be noted from the second of these two photographs that the ends of several strakes of shell and deck plating have been left projecting beyond the bulkhead; these are of varying length so that they may pick up the original butts on the after portion of the vessel. Where the original shell butts were a few spaces forward of the bulkhead, short filling-in plates were fitted between the butt and the bulkhead for watertightness at launching.

The actual launching was no more difficult than in the case of an ordinary full-length ship, and drag chains were employed to prevent the hulk running too far in the water. The vessel stood



The new bow after launching.

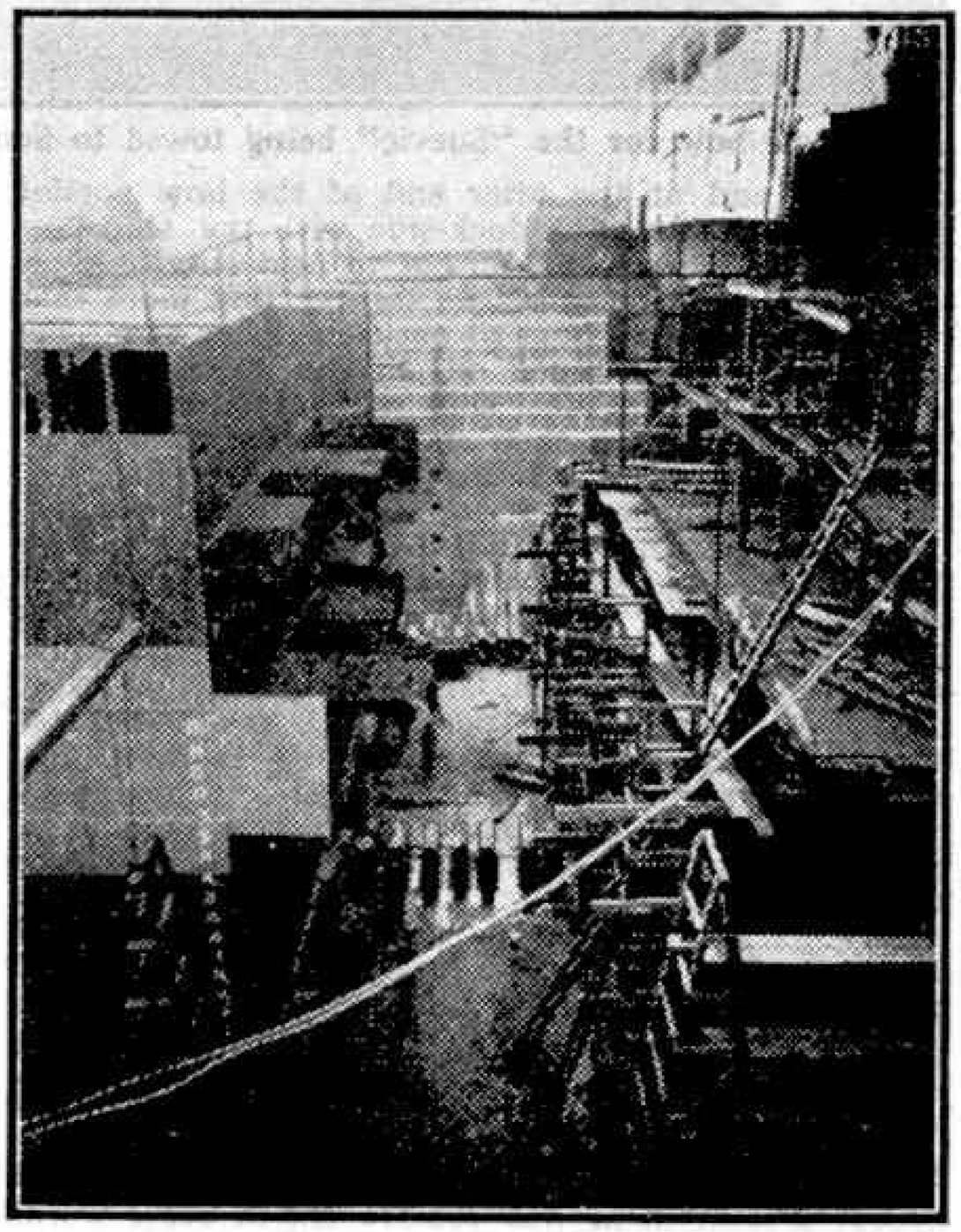
upright in the water and trimmed beautifully as can be seen in the photograph; the draft forward was 13 ft. 8 in. and aft 9 ft. 3½ in. This draft was perfectly satisfactory for the launch and for towing, but it was not suitable for joining up with the after end. Because of this, additional ballast, consisting of a further 40 tons of cables, was placed at the after end of No. 2 hold, and 6 tons of inclining weights were placed abreast No. 2 hatch on the upper deck. The reason for using the inclining weights is given further on in this article. It was considered desirable to have the bow portion trimming 2 in. by the stern, and so just sufficient water was run into the tanks to obtain this condition, resulting in a draft of 11 ft. 10 in. forward and 12 ft. aft.

The drafts of the after portion were 16 ft. forrard and 18 ft. 6 in. aft, which were much more than those of the new bow; and this, as will be explained, made it possible to join the two portions in the drydock without the aid of any elaborate equipment.

In the drydock, preparations for the intricate work were pushed forward, the keel blocks were fitted with new oak copping pieces and sighted for alignment. Both portions of the vessel were floated into the drydock and then the water was slowly pumped out. As the after portion has a greater draft, it landed on the keel blocks first, and great care was exercised to ensure that that portion of the *"Lochmonar"* was shored perfectly plumb and on the centre line of the blocks. The new portion of the hull was landed on the blocks about 20 ft. clear of the after portion and similar care was taken to keep it plumb and in alignment.

The ragged edges of the plating where the two portions of the vessel had broken asunder on the Mersey were still attached to the after end, and the work of cutting these off together with other damaged portions on the ship's bottom was put in hand as soon as the dock was drv. The shell, deck and tank top plating were cut back to the selected butts so as to suit the arrangement of the closing-in plates.

The *"Lochmonar"* has what is known as a "slab" keel, which consists of a 10 in. wide and 2 in. thick flat steel bar riveted on to the keel plate. A "V" shaped cradle, 10 in. wide at the base, was made on the keel blocks to act as a guide for this slab keel. Electric winches were fitted on the vessel's upper deck, one port and one starboard, alongside No. 3 hatch, and eye plates were riveted to the deck in suitable positions to take the tackle, the other end of which was secured to bollards on the forward portion for heaving the new portion into position. Two 14 in. logs of timber were bolted on the ship's side, port and starboard, so as to form additional guides



The two ends of the "Lochmonar" in drydock before being joincd together.

and also to act as a check to stop the bow portion when it was in its correct relative fore and aft position. These logs were cut carefully to exact lengths of 25 ft. 10.15/16 in. for the upper two, and 25 ft. 10½ in. for the lower two. Large angle lugs were bolted in correct positions on the after part of the vessel to form stops for the ends of these logs. The slight difference in the length of the upper and lower logs was made as an offset against the 2 in. trim by the stern which had been given to the bow portion.

After these preparations had been completed the drydock was flooded once more, but this time with only just sufficient water to float the bow portion 6 in. clear of the keel blocks—this amount of water was not, of course, deep enough to cause the after portion, with its deeper draft, to float. The winches were then put in motion and the bow was drawn up gradually to the stern, until the side logs brought up on the stops. The two shores at each side of the stem bar and at the after end of the bow portion were carried along the dock-side with the ship, and since these shores had been cut to neat lengths there was never any chance of the ship getting more than a fraction of an inch out of position either way. The water was then pumped out of the dock until the aft end of the new keel slab was just touching the blocks; the bow was then checked and corrected for list by means of the inclining weights which had been placed on the upper deck for this particular purpose.

The dock was then pumped dry, bilge shores were fitted and the keel sights were checked. The temporary wooden bulkhead which had been fitted for towing the after portion of the "*Lochmonar*" from Liverpool to Belfast was removed, and the closing plates in the shell of the new fore part, which had been fitted temporarily to ensure watertightness at launching, were cut away. Permanent shell plates, beams, deck plates and girders bridging the gap were then fitted and the bow and stern portions made into one complete vessel.

The first docking of the two portions took place on 6th August, and on 10th August they were brought into position and joined together. By 12th September all work had been completed and the whole vessel undocked; the joining up had taken only 28 working days.

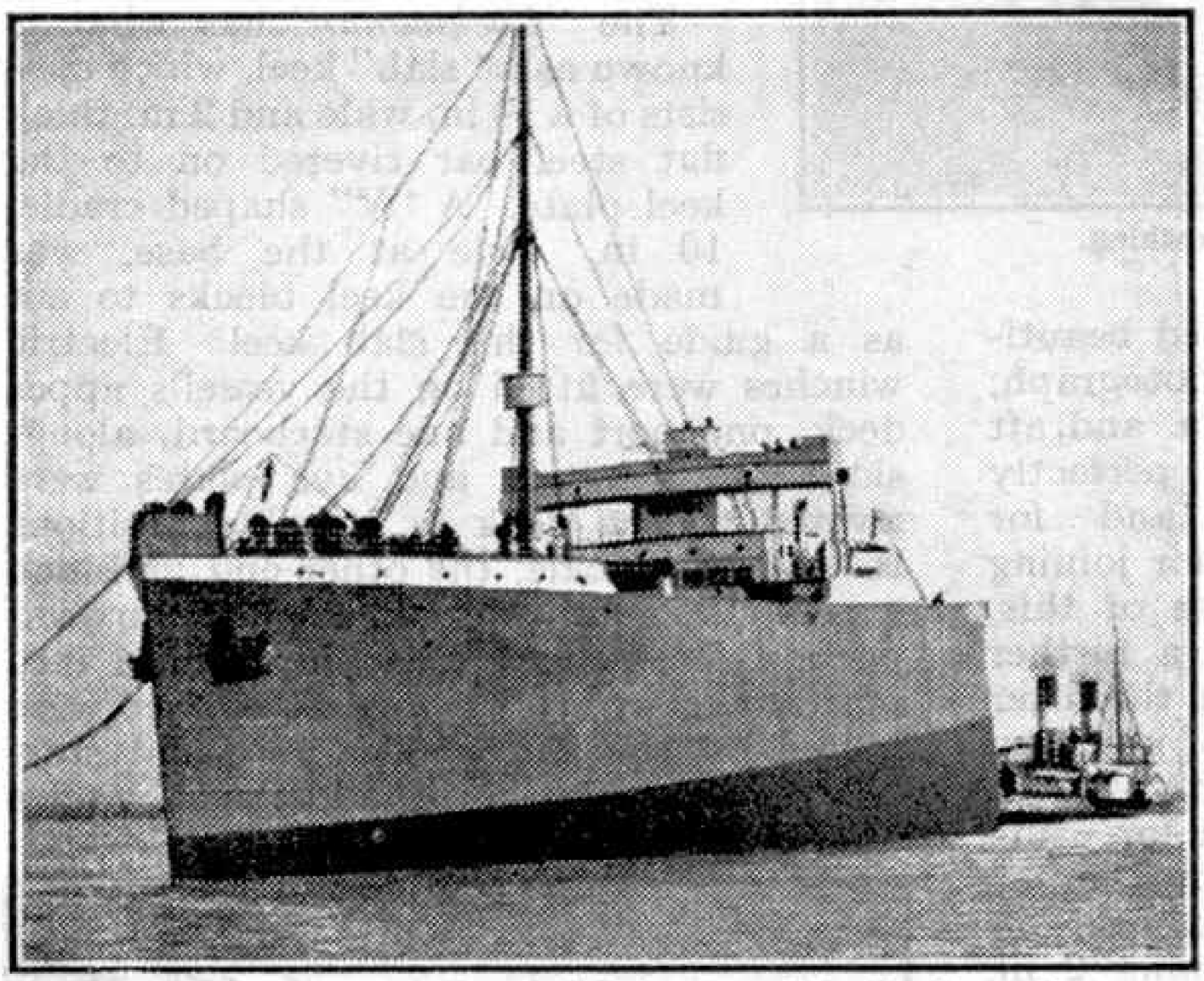
The Board of Trade measurement of the vessel's length when first built was 485.65 ft. and the new B.O.T. measurement was 485.675 ft.; in other words the new "*Lochmonar*" was within 0.025 ft. of her original length. When one considers the many factors involved and the difficulty of the task it will be agreed that this is a truly remarkable performance.

The outstanding feature of this major repair was the almost entire absence of elaborate appliances for getting the two portions of the hull into correct position and retaining them there while the joining up material was being fitted. The success of the whole operation depended on fine adjustment of the draft and trim of the two sections of the hull and the accuracy of the intricate calculations in deciding the amount and the position of the ballast.

When the "*Lochmonar*" sailed up the Mersey on her next voyage she provided the unusual spectacle of a ship passing a piece of herself! The author was on board the "*Lochmonar*" in Belfast in 1944 when she was in for an engine overhaul and found it hard to believe that this stout vessel had ever been through such a "nerve-racking" experience.

A similar repair to that carried out on the "*Lochmonar*" was undertaken by Harland and Wolff Ltd. some years before on another vessel, the White Star Liner "*Suevic.*" This unfortunate ship was also a comparatively new vessel, when, on her way home from Australia via the Cape of Good Hope, she was out of her reckoning on entering the English Channel and had the bad luck to run on to some of the dangerous rocks off the Lizard. At the time of the accident the "*Suevic*" with a tonnage of 12,530 was the largest vessel steaming from the United Kingdom in the Australian Trade.

A survey was carried out and it was established that the fore part only was ashore. After some strenuous and brilliant salvage work, quite two-thirds of the ship were cut away by means of blasting and, not without grave peril, towed all the way up Channel to Southampton where the ship was docked. Harland and Wolff Ltd., who had built the "*Suevic,*" at once set to work to build a replica of the bow portion which had been left on the Lizard rocks, and this new section was eventually towed round to Southampton from Belfast. The photograph shows this bow portion being towed by tugs on its perilous passage to Southampton, an experience which the builders did not have to face in the case of the "*Lochmonar.*" On arrival at Southampton the two portions of the "*Suevic*" were drydocked and joined up, and the liner resumed her normal work in due course.



New bow for the "Suevic" being towed to Southampton.

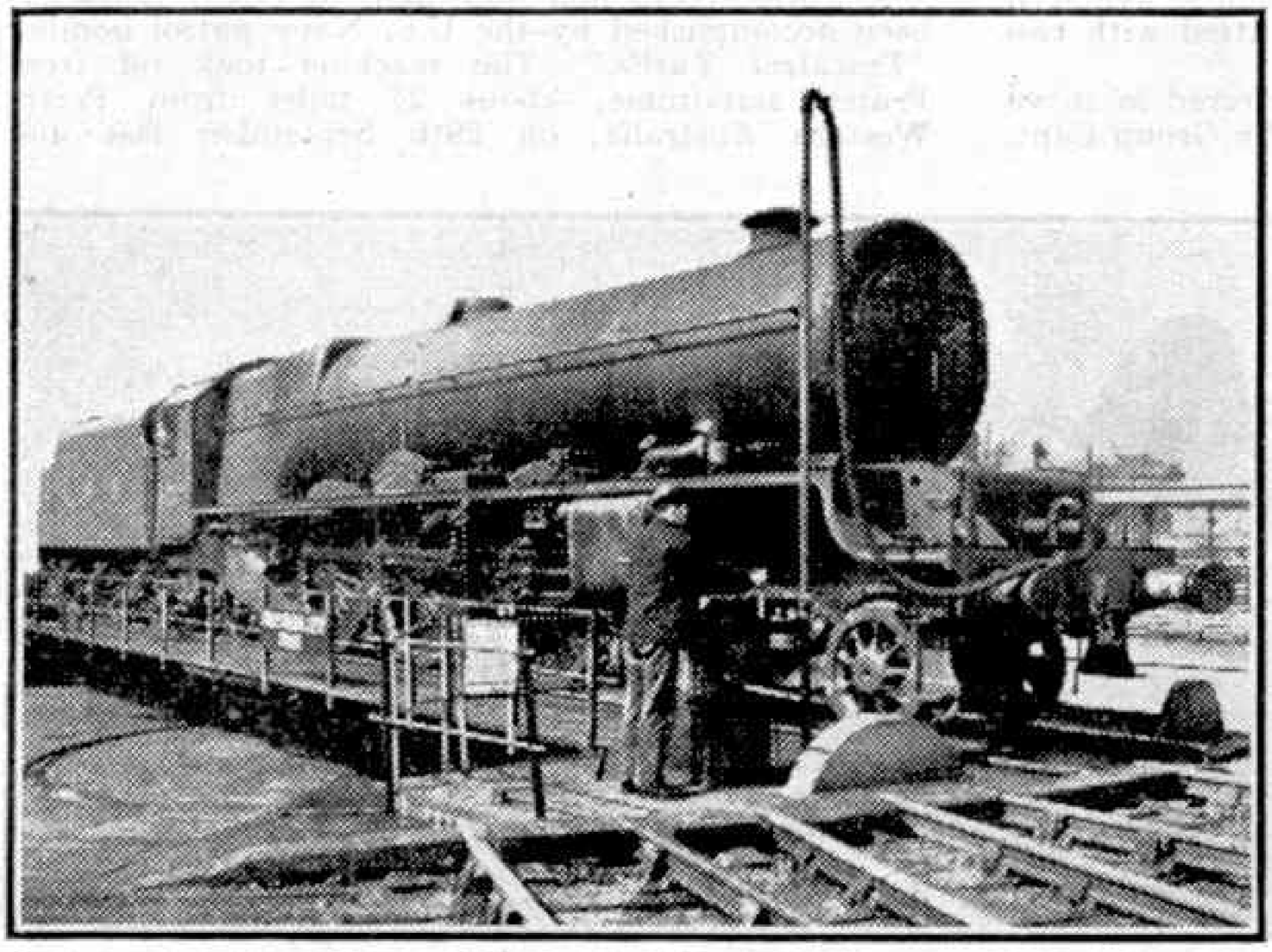
The "*Lochmonar*" and the "*Suevic*" both had their new bow portion built on a slip, then launched and brought to them for joining up in a drydock. Some vessels which have been seriously damaged and required a new fore part have had the new section actually *built* on and not *joined* on. Such a case occurred some two years ago when the Swedish steamer "*Tom*" stranded on some rocks off the Baltic coast and could not be got off in one piece. The after part was separated with dynamite from the grounded forward portion, just in front of the bridge, and was then towed to the Eriksberg shipyard in Goteborg. There it was docked and prepared for its new bow and forward portion.

The work proceeded to the satisfaction of all concerned, by the third day the new bottom plates were laid out in front of the after part of the "*Tom*" in the Eriksberg floating dock; by the tenth day the double bottom was laid out and the frame structure had been commenced; by the fifteenth day the frames and the shell plating were ready and the deck beams were being placed in position; and by the twenty-sixth day, seven working days before the date fixed by contract, the "*Tom*" was ready for undocking and fitting out with windlass, winches and derricks.

How Engines are Turned

THE cover of this month's "*M.M.*" shows one of the most familiar operations in connection with the daily working of a locomotive—turning the engine round on a turntable. The engine shown is one of the S.R. "West Country" 4–6–2s at Redhill in the course of a trial run from Brighton Works. The turntable is of the centre-balanced type with a deep well, the top of the table being provided with deck.

There are nearly a thousand turntables in this country. They range from 45 ft. to 70 ft. in diameter, according to their age. The majority of them are of the centre-balanced type, that is the ease of turning is secured by setting the engine in such a way that the load is taken on the centre pivot. This pivot may have ball-bearings, but many tables have plain bearings made of hardened steel, rather like two inverted saucers on top of one another, and this design of course was perfected before ball-bearings came into common use.



A vacuum operated turntable in use. Note the hose connection between the engine and the turntable motor unit. Photograph by courtesy of the L.M.S.

Readers will often have seen the driver setting his engine on a turntable, moving it an inch or two backward or forward until a balance is secured. This is not difficult provided the turntable is somewhat longer than the engine. When turning an engine with a 54 ft. 8 in. wheelbase on a 55 ft. diameter turntable, however, it is not so easy, and with certain classes of engine it may be necessary to have a half-tender of water before the right balance can be made, which may or may not involve a call at the water column first. The amount of coal on the tender also affects the balance.

With good balance the table can easily be pushed round by one man; in fact so good can the balance be that a high wind has been known to keep a turntable in motion and the engine has gone on revolving until the driver has mounted the footplate and moved his engine slightly one way or the other in order to throw the table out of balance. For this reason some tables in very exposed places are protected from the wind by a timber palisade.

The table itself is constructed of girders. With the "well" pattern these girders are underneath the rail platform, and with the "through" pattern the girders are side by side with the rail platform between them. Both patterns have their advantages and disadvantages. The deep well provides good access for inspection, and the construction of the table is fairly simple, because the load of the engine is taken direct on the girders. On the other hand, a well can only be constructed where the level of the land provides good drainage, and for obvious reasons there must be a decking, with protection rails, for the safety of the staff. Occasionally, too, a mishap will occur through an engine being moved before the turntable is set for it, and a deep well is not a nice place from which to lift a 90-ton locomotive! The through type is much preferred when the table is in the middle of a roundhouse shed, as it requires only a shallow pit.

To avoid the need for balancing, an engineer on the Dutch State Railways some years ago invented a flexible table known as the "Mundt" turntable. The girders are reduced in size towards the centre of the table with this design, so that when an engine runs on to one end, the other end does not rise, and the weight of the engine is carried partly on the centre pivot and partly on the circumferential race rail. The weight of the engine is distributed more evenly over the foundations of the turntable instead of being concentrated on the pivot casting. Several dozen large tables of this pattern are now in use on British railways.

The ease of turning a centre-balanced type table in good condition accounts for the fact that only a small proportion of the turntables in this country are power-operated. A few are driven by electric motors or hydraulic rams. The most popular method of power-operation nowadays is the vacuum-motor, and the number of larger turntables so fitted runs into three figures. The machine consists of two double-acting oscillating cylinders 4½ in. diam. by 6 in. stroke, connected by a flexible pipe to the vacuum system of the locomotive being turned. The driver stays on his engine, and when given the signal to start he creates a vacuum by means of the ejector. The oscillating cylinders then operate by "suction," and drive, through gearing, a runner wheel on the race rail of the turntable. The whole apparatus is mounted on a small carriage of its own, connected to the frame of the table, at one corner by brackets. The adhesion of the runner wheel to the race rail is provided by the weight of the machine.

The fireman does the duty of connecting the hose-pipe and controlling the air-motor by a lever. He certainly has a "joy ride." Perhaps the most difficult part is to remember to take the flexible pipe off before moving the engine from the table—it is so easily forgotten!

Our illustration shows a "Princess" class Pacific, L.M.S., being turned at Camden on an articulated turntable fitted with a vacuum-motor as previously described. By the way, an articulated turntable has the girders hinged on the centre-piece, to provide flexibility. In this respect it possesses the same advantages as the "Mundt" design, but owing to the joints it is generally considered less reliable than the continuous girders used in the Dutch patent.

Air News

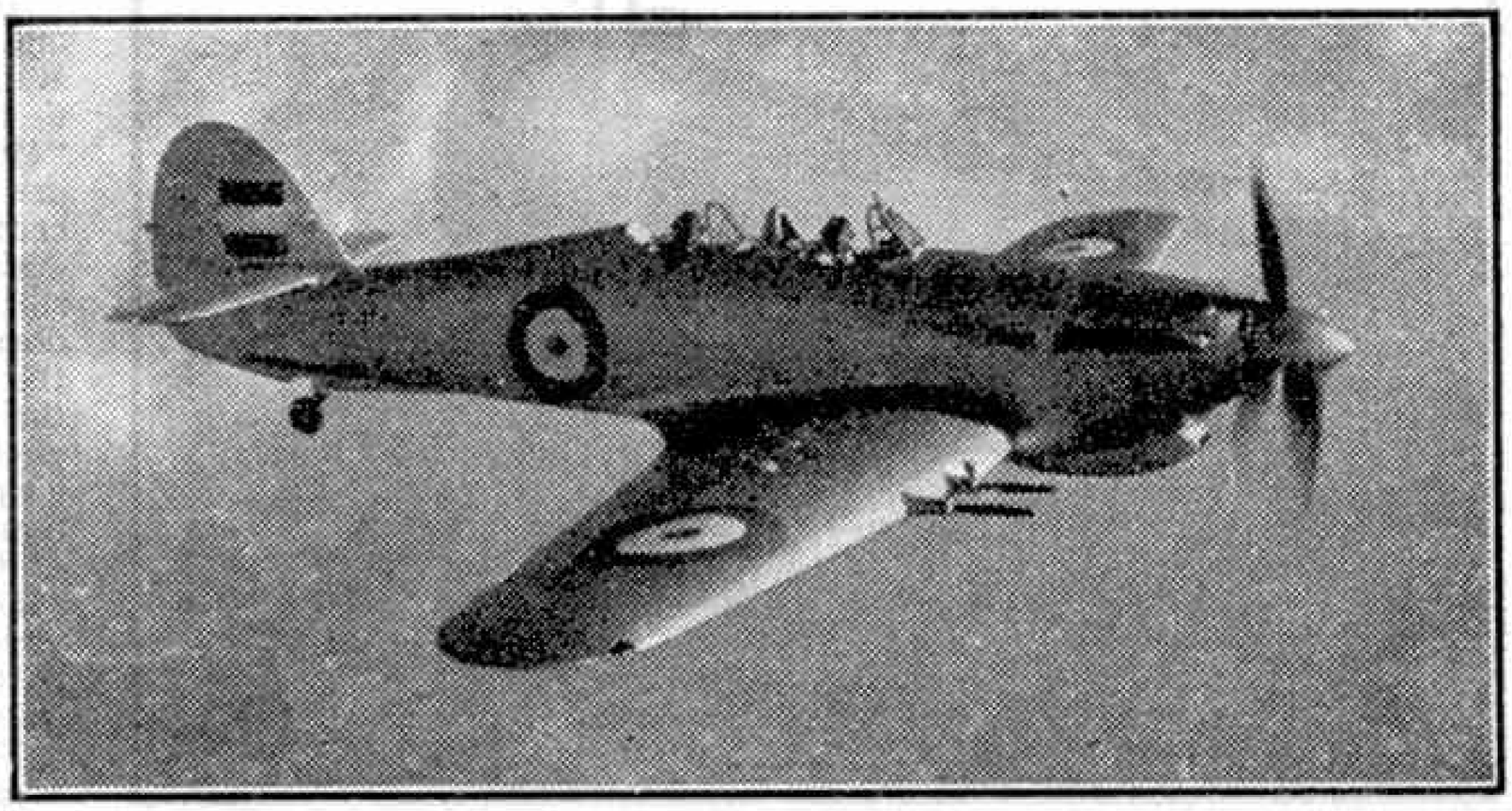
"Meteor" Sets Up New World Air Speed Record

The Gloster "Meteor" IV aircraft EE549 set up a new World Absolute Air Speed Record on 7th September last by flying at an average speed of 616 m.p.h., an increase of 10 m.p.h. on the previous record. The machine was piloted by Group Capt. E. M. Donaldson, D.S.O., A.F.C., the Commanding Officer of the R.A.F. High Speed Flight at Tangmere, and the flight was made over the F.A.I. 3-kilometre course off Littlehampton and Rustington. A few minutes after the return of EE549 another "Meteor," EE550, took the air. It was piloted by Sq. Ldr. W. A. Waterton, A.F.C., and flying over the same course averaged 614 m.p.h. Each of the machines is fitted with two Rolls-Royce "Derwent" V turbojets.

The previous record of 606 m.p.h. referred to above was achieved in November last year by Group Capt. H. J. Wilson, also with a "Meteor" IV, and a special article on it was published in the December 1945 "*M.M.*"

"Hurricanes" for Iran

The first Hawker "Hurricane" flew 11 years ago, on 6th November 1935, and yet this versatile little fighter that played a major part in defeating the Luftwaffe in the Battle of Britain is still giving good service with several foreign air forces. For example, Iran has just taken delivery of 34 ex-R.A.F. "Hurricane" IICs which have been reconditioned by Hawker Aircraft Ltd. in their Langley factory. A point of special interest is that four of these machines have been modified as two-seaters for training pilots to fly the fighter versions. This has been done by removing the sliding hood and cutting back the wooden fairing behind the cockpit, and putting a second seat, dual flying controls and duplicate sets of all the more important instruments and controls where the radio used to be fitted. The rear set of controls is linked to the forward set, and the idea is for the pupil to occupy the front cockpit, which is identical with that of the "Hurricane" IIC fighter, with the instructor in the rear seat. Incidentally this trainer has a top speed of over 320 m.p.h.



One of 34 ex-R.A.F. Hawker "Hurricane" IIc fighter aircraft which have been reconditioned and delivered to Iran.

In these days of 600 m.p.h. jet fighters it is strange to think of an air force ordering "Hurricanes," with their top speed of 335 m.p.h., as front line fighter equipment. The reason is that because of the recent war many small air forces such as that of Iran are still equipped mainly with very old biplanes. The future of a pilot who was suddenly taken off them and put on to jet fighters would not be very certain! In Iran these "Hurricanes" will help bridge the gap.

J.W.R.T.

Gas Turbine-Powered Trainer

Shortly after the Air Ministry announced that all new fighter aircraft built for the Royal Air Force must be powered by jet engines, it was revealed that prototype orders have been placed for two new training machines powered by gas turbines. The first of these machines is being built by Boulton Paul Aircraft Ltd., of Wolverhampton. The type of gas turbine (propjet) to be used has not been revealed, but it will drive a constant speed propeller and the jet exhaust will be utilised to provide extra thrust. Among the advantages claimed for this type of power unit, apart from higher power, are lack of vibration, easier handling at low altitudes, lower all-up weight and quicker take-offs, as jet engines do not need "warming up."

The new Boulton Paul trainer will be very versatile, being suitable for pilot, gunnery, navigation or bombing instruction by day and night, glider towing or drogue target towing. It will be of all-metal construction, have folding wings and be readily adaptable for deck landing. The roomy cabin will provide accommodation for a passenger or navigator as well as side-by-side seating for the instructor and pupil, and in aerobatic qualities the aircraft will be comparable with the R.A.F.'s single-seat fighters.

J.W.R.T.

Non-Stop Flight of Over 11,000 Miles

A world record non-stop flight of 11,237 miles has been accomplished by the U.S. Navy patrol bomber "*Truculent Turtle.*" The machine took off from Pearce aerodrome, about 27 miles from Perth, Western Australia, on 29th September last and 55 hr. 18 min. later landed at Columbus airport, Ohio, U.S.A. The original intention to fly non-stop to Washington was abandoned as too risky when it was found that the fuel gauges were not working accurately. Comdr. T. Davies, who led the flight, said on landing that the machine had encountered head winds all the way across the Pacific and cold weather and ice when near San Francisco. "*Truculent Turtle*" is a Lockheed P2V-1 "Neptune" aircraft, a twin-engined type still on the secret list.

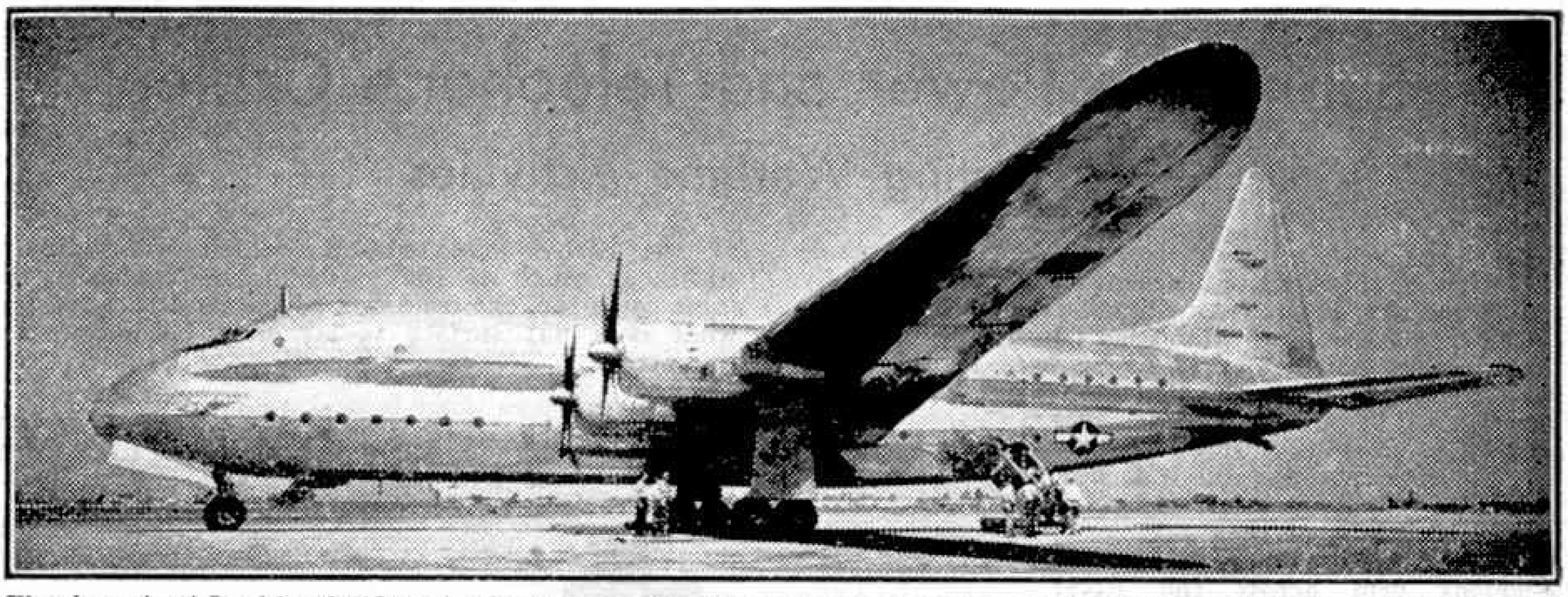
This great flight exceeds by over 3,000 miles the previous record of 7,929 miles made by the U.S. Army "Superfortress" "*Dreamboat*" in November last year, when it was flown from Guam in the Pacific to Washington in 35 hr. 5 min. Before this event the longest distance flown non-stop was 7,158 miles, accomplished in November 1938 by three R.A.F. "Wellesley" single-engined machines when they flew from Egypt to Australia.

A notable long-distance flight was made last month by a U.S. Army "Superfortress" named "*Pacusan Dreamboat,*" which took off from Honolulu on 4th October and landed at Cairo two days later, having flown 9,500 miles in 39 hr. 36 min. The route followed led over the Magnetic North Pole.

* * * *

Royal Dutch Airlines (K.L.M.) have ordered seven more Lockheed "Constellation" transports, which, when delivered, will bring the K.L.M. fleet of these machines to 11. The company have also ordered 12 Consolidated Vultee "Convair" twin-engined air liners.

Quantas Empire Airways, of Australia, are ordering four "Constellations."



The 4-engined Lockheed "Constitution" transport, the largest aeroplane ever built for the U.S. Navy. Photograph by courtesy of the Lockheed Aircraft Corporation, U.S.A.

Largest U.S. Navy Transport

The impressive aircraft shown in the photograph at the top of this page is the Lockheed "Constitution," the largest machine built for the U.S. Navy, and designed to meet that Service's need for a large land-based transport with high speed and great range. It is a two-deck aircraft, with spiral stairways fore and aft connecting the two decks. Up to 92 passengers can be accommodated on the upper deck, and 76, with a crew of 12, on the lower one. Cargo space ranges from 2,000 cu. ft. with 168 passengers to 7,405 cu. ft. when the entire lower deck is used for freight.

The "Constitution" has a wing span of 189 ft., is 156 ft. long and weighs 92 tons. At present it is fitted with four 3,000 h.p. Pratt and Whitney "Wasp Major" engines, but they can be replaced by gas turbines when these become available. Man-size tunnels inside the wings enable inspection and adjustment of the engines and accessories to be made during flight. The speed of the "Constitution" is stated to be 300 m.p.h. and the maxiumum range 6,000 miles.

Air France's New Equipment

Several of the 15 "Languedoc" 161 air liners ordered by Air France are now in service alongside the company's "Skymasters," and are being used on the Paris—London route. The "Languedoc" is not a new design, and the contract for air liners of this type was placed with the designer, Marcel Bloch, before the war. Nevertheless, the first few production machines have consistently bettered their estimated performance figures. For instance, cruising speed was estimated to be about 218 m.p.h., and yet, on a 1,900 mile trial flight from Paris to Algiers and back, the first "Languedoc" averaged over 230 m.p.h. The return trip with 33 passengers aboard was, in fact, made at an average speed of 256 m.p.h.

J.W.R.T.

The SUC–10

The SUC–10 light monoplane, shown in the bottom photograph on this page, will be something of a shock to those folk who consider that French aircraft design is behind the times. It is, in fact, one of the neatest personal aircraft on the market to-day, and has an almost ideal general layout. The high wing arrangement ensures a good view sideways and downwards from the cabin during flight. As the engine is mounted at the rear of the streamlined fuselage, driving a pusher propeller, there are less engine fumes and noise in the cabin than with the more conventional tractor layout, the forward vision past the nose is excellent, and there is little risk of damaging the propeller and engine in a bumpy landing.

The SUC–10 is an all-metal machine and has a 193 h.p. Mathis engine. It has a wing span of 37 ft. 8 in., is 26 ft. 9 in. long and has a loaded weight of 2,943 lb. With four passengers and their luggage it will cruise for 570 miles at a speed of 143 m.p.h. Alternatively, carrying three passengers, its range goes up to 870 miles. Unfortunately for the would-be private-owner, suitable petrol is almost unobtainable in France except in the black market—at 360 francs a gallon!

J.W.R.T.

China to Build Boeing "Kaydet" Trainers

The Boeing "Kaydet" Pt–17 trainer aircraft, credited with giving primary training to more of America's fighting airmen than any other machine, is to be produced under licence in the Republic of China for use in building up the air force of that country. About 10 Chinese technicians have been sent to the Boeing Company's Wichita plant where the "Kaydet" is built, to receive instruction in the manufacture and maintenance of this machine. Under the terms of the agreement the company are providing the Chinese representatives with the blueprints and other data necessary to enable the machine to be produced in China. Several "Kaydets" from U.S. Army surplus stock are being overhauled and equipped with new engines, and will be sent to China as prototypes for the manufacturers there.

This odd-looking machine is the French SUC-10. It can carry four passengers and their luggage.

Submarine Power and Telephone Cables

Interesting Wartime Activities

IN recent years great developments have been made in the manufacture of long lengths of cables specially protected for underwater installations. During the war period some very interesting power and telephone cables were made and laid by Siemens Brothers and Co. Ltd., of Woolwich, London. Reference to these achievements was not possible during the war for security reasons, and it is now interesting to give a brief description of two or three of them.

Four cables have been laid by the Siemens firm across the River Duddon in South Cumberland since 1938. Two of these were telephone cables forming part of the P.O. trunks from Barrow to Whitehaven, and the other two were power supply cables for the Barrow Corporation. Each of the telephone cables had a total length of 3,270 yards, of which 330 yards was laid across marshland leading to the estuary proper. The total length of each power cable was 2,887 yards. The crossing of the River Duddon differs from the usual shore to shore operations. Here there is a waterway which at low tides, except for the narrow Duddon stream, is dry over the entire route. Tides in the estuary are swift running, and slack water at high tide, the best working period, is of short duration. This effectually prevents the laying of more than one drum length on any one tide. As the estuary is open to the south-west, and only about one mile from the coast line, work was considerably hampered by gales from that direction. At low tide a very strong wind will sometimes whip the sand waist high; great caution is always necessary to avoid soft sand patches, somewhat resembling quicksands. Some difficulty is presented by the very erratic course of the Duddon, and more especially of the Kirby Pool tributary which will shift its course as much as 100 yards in the 24 hours. In some cases too, the condition of the sand changes and what is a flat surface to-day may be hummocky to-morrow.

Duddon Estuary: Power Cable joint being buried. The illustrations to this article are by courtesy of Siemens Brothers and Co. Ltd.

For the actual crossing, five lengths of cable were used. Two cables from the Askam shore, each 515 yards, were drawn out by manual labour assisted for part of the way by a lorry where the sand was flat and not too soft. The remaining three drum lengths each 500 yards were laid from the Millom shore, where a greater depth of water is obtained.

In the early installations a small ship was used for the purpose (shown in the illustration), but for later contracts the laying was done from a pontoon, towed by a 35 h.p. petrol driven motor boat, as this was found easier to control and its lower deck greatly facilitated the work.

To ensure accuracy of line, buoys were laid along the route to mark the position of each length. All cables after laying were snaked along their entire length in order to relieve any strain in the joints which might arise due to movement of the sand. The separate lengths were laid with an overlap of all ends, to each of which a mark-buoy was attached. Although the jointing positions were dry at low tide, the dry period was not sufficient for a complete joint to be made and so the pontoon was used for this work. The ends of the cables were lifted on to the deck and the pontoon moored head and stern to prevent swinging. The joint when completed

Cable laying from coil.

River Humber: Landing a shore end.

was carefully lowered on to the river bed and then buried. A special submarine type of joint box was used for the operation, in which both ends of the joint box take the armour wires in a clamping device, thus preventing any strain on the actual joint itself.

Some of the cable jobs were carried out in conditions of great difficulty and danger. For instance in 1941 some long lengths of telephone cable were laid across the Bristol Channel between Swanbridge on the Welsh side, joining up the islands of Flat Holme and Steep Holme, and terminating at Breandown in Weston Bay, Somerset. Laying was carried out by a small coaster. At each landing the ends were hauled ashore by manpower, some 60 to 70 troops being made available for the work. Much delay was caused by the special precautions that had to be taken against mines and other forms of enemy action, as this area was extremely vulnerable at that time.

The Grimsby - Hull cabling scheme for P.O. telephone trunks necessitated a crossing of the River Humber, and this work was undertaken by the Company in May 1945. The cables cross the Humber in the district of Hessle, and at this point the river is 1½ miles wide with a tidal flow of approximately 4 knots and banks of highly glutinous mud. Two cables were laid, their total length being 6,420 yards.

The vessel selected for the work—a 160-ton motor coaster—served the dual purpose of transporting and laying the cables, which were loaded at the Works, the voyage to the Humber occupying four days. Paying-out gear was fitted and electrical test equipment was supplied to enable check tests to be taken during the laying and after completion.

High tide is invariably the most suitable time for cable laying in such waters, and the tide chosen for the first day's lay turned at 10.45 a.m. The landing of shore ends is essentially a daylight operation and work commenced at 6 a.m. to ensure the first end being landed and secured on shore by tide time. Whilst work at the shore end was in progress, the route was marked by buoys at intervals of a quarter of a mile and all were ready at the appointed time. The cable was paid out direct from a coil in the hold through a series of guides to the brake gear and over a roller guide into the water. When a vessel is moving through the water the course is changed by a movement of the rudder, and her stern swings to the required direction. However, with cable being paid out aft, the stern no longer has the same freedom of movement, and with a low powered vessel in narrow tidal waters, as in this case, it is necessary for a tug to be used in order to maintain complete control at all times. The actual crossing occupied only 35 minutes and on nearing the further bank the tug was cast off and the laying vessel continued in shore until she grounded on the soft mud. From this point to the shore jointing position was 175 yards, but it was required to heave 320 yards of cable ashore to meet electrical requirements. This work continued throughout the remainder of the day and it was 10 o'clock at night before it finished.

The laying of the second cable was almost a repetition of the first, with a day's interval for necessary adjustment to the paying out equipment, shifting mark-buoys to new positions, etc. Anchoring, trenching and burying the shore ends, winding spare cable on to drums and dismantling the vessel occupied a further three days.

Another interesting job was the laying of a power cable across the Cattewater, in Plymouth Harbour. The length of cable manufactured was 730 yards, and the whole length was coiled on one drum, the gross weight of which was 13½ tons. (Cont. on page 480)

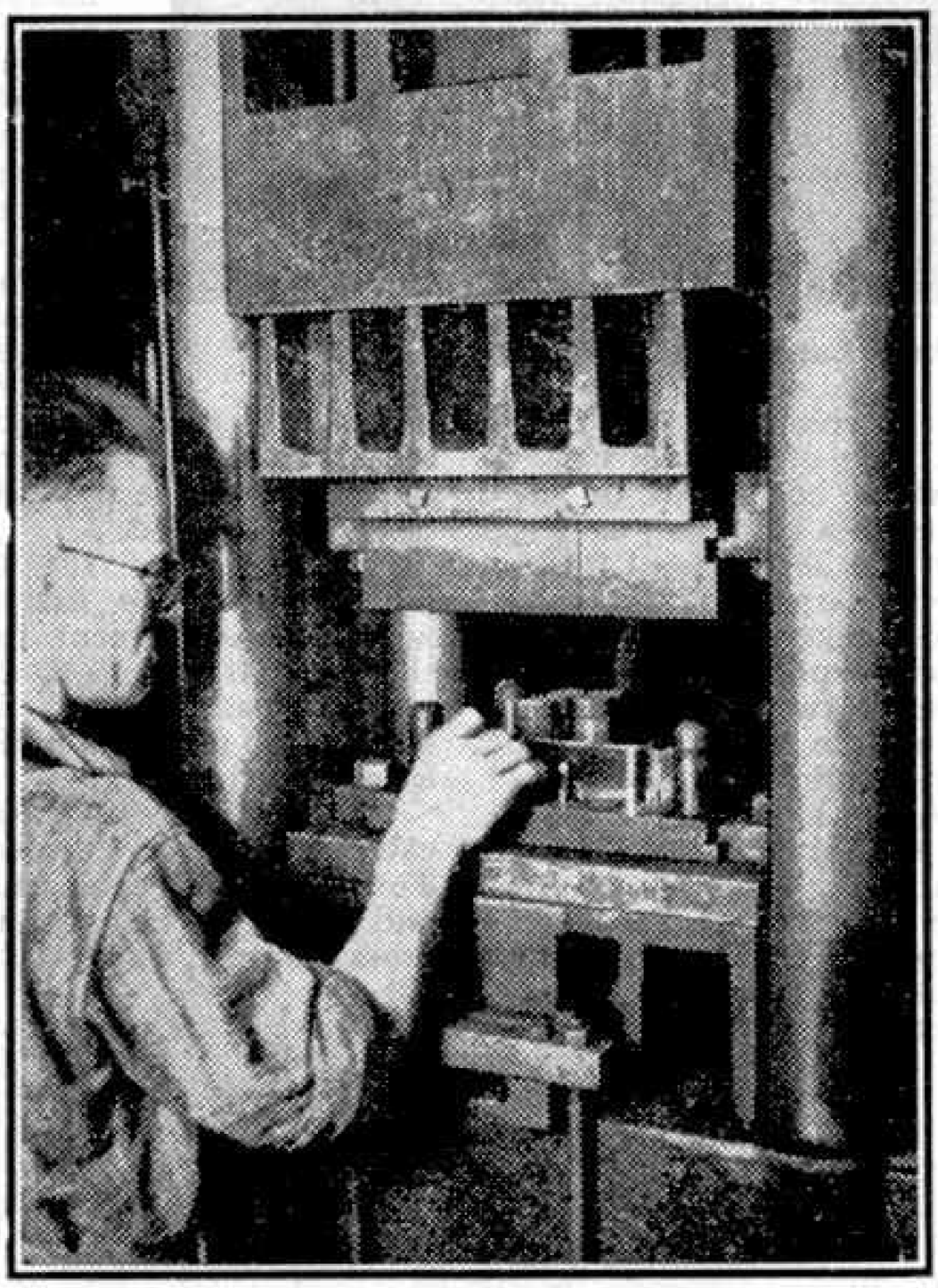
Cattewater: Cable laying from drum.

Plastics in Everyday Life

III—Moulds and Presses

IN the previous articles we developed an understanding of the nature of plastic materials and the processes required to prepare them for the final stages of manufacture. To shape the materials, whether they are moulded in solid, granulated, flaked, powdered, or liquid forms, they have to be subjected to heat and pressure. Only in a few cases may the materials be pressed out cold. The methods and machines used for producing the final shapes will be considered in this article.

The moulding technique varies, of course, with the character of the plastic and the shapes and sizes of the finished product. Let us suppose the designer has been asked to prepare the dies and moulds for the production of a small plastic article which has to withstand wear and tear. He will almost certainly use a simple compression mould, single or composite, and employ a heat hardening plastic, one of the phenolic group, which, mixed with a suitable filler, such as asbestos, mica, or canvas, will perform a fairly heavy duty and resist normal temperature. The use of a thermo-plastic for a heavy duty would be entirely unsuitable, as that class of plastic is unable to resist extremes of temperature and has a soft yielding nature. It is usually used for non-stressed work, and for decorative features. If the part has to withstand friction or abrasion, a proportion of graphite will be added to the mixture, the oily nature of which will prevent any seizure. Some of the rolling stock in Germany were fitted with bearings of a plastic compound of this character when that country was short of metal.



Operator loading a semi-automatic mould with phenolic material in tablet form. The photographs that illustrate this article were taken at the Elo Works of Birkbys Ltd., Liversedge, Yorks.

Now the designer will decide that, since the part is relatively small in relation to the size of the standard moulding plate for the particular press he is using, he can arrange for a number of dies to be inset in the plate at the same time. In this way several of the articles are produced at each operation. It is obvious that the two parts of the mould, known as the top and bottom plates, must close together accurately, and to ensure this metal dowels and opposing holes, running fit size, are used. The dowels, with chamfered ends, are usually fixed in the top plate, so that the bottom plate is clear for the rapid removal of the finished plastic, and so that placing of the fresh moulding material in the dies may be carried out by the operative. It is usual for the bottom mould to remain stationary, and for the top mould to be the moving part. The designer also arranges that the handling of the press and moulds shall be as foolproof and light as possible to avoid fatigue by the operatives who are usually non-skilled labour.

In the process of moulding thermo-setting plastics the powder has to be placed by hand into the mould or die. To ensure that the correct amount of powder is used, and allowing perhaps a small surplus percentage, careful calculation and experiments are carried out to avoid wastefulness by the use of too much powder, or a product pitted with air pockets where insufficient powder has been used. Correct amounts of the powder are proportioned out by a special press known as a pelletting machine, which compresses

the powder into pellets of a predetermined size. These pellets are easily handled by the operatives and contribute towards economical production.

The pellets are placed on the bottom moulding plate. The operative then closes the moulds, either manually, or indirectly by opening a valve which allows hydraulic, steam, or air pressure to be exerted, which is required to be either a few pounds, or perhaps many tons, according to the nature of the plastic and the required density of the finished article.

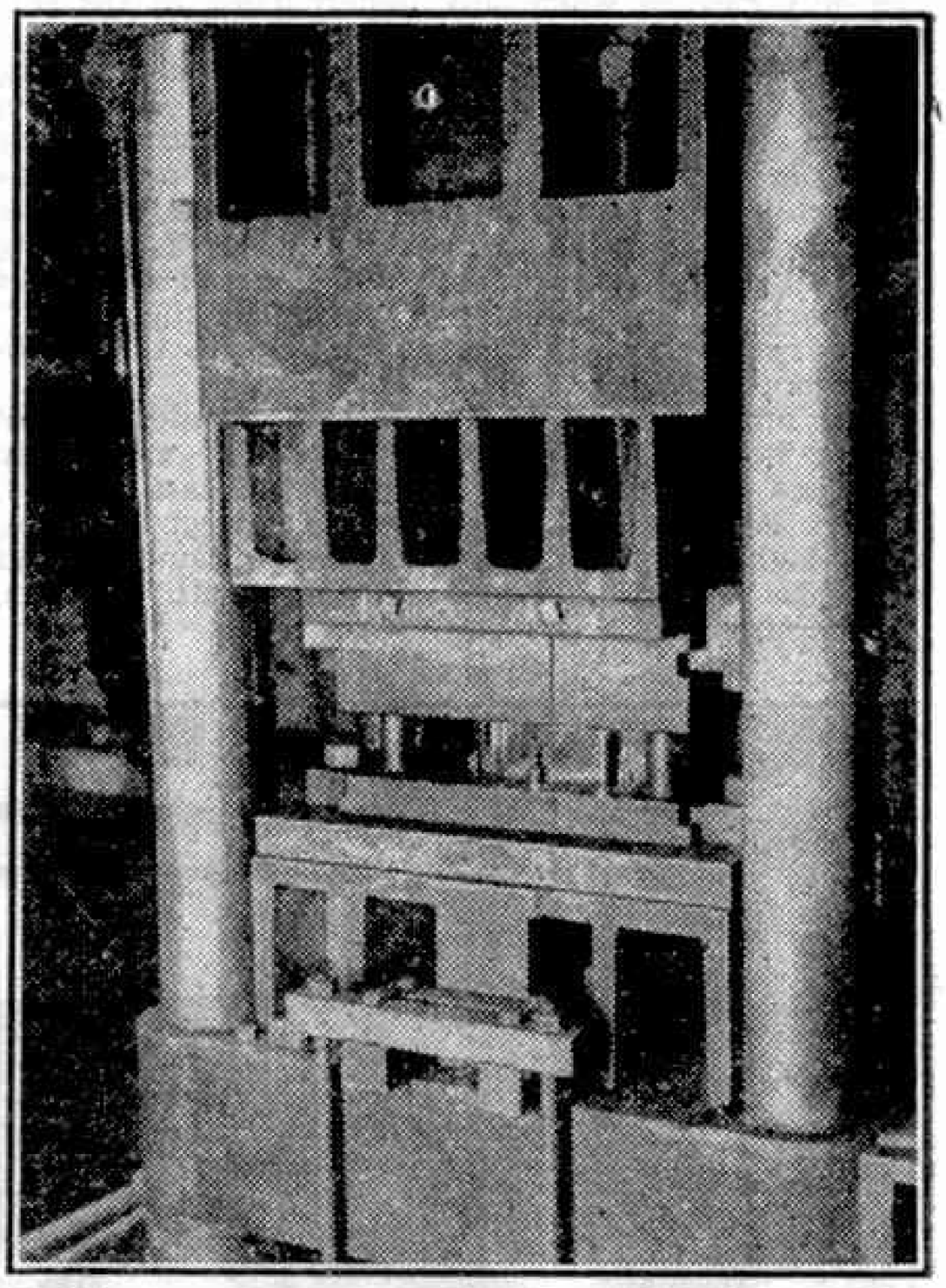
The heat, which causes the powder to flux or flow, is usually supplied to the mould through heating platens placed one above the top mould plate and one below the bottom mould plate. Superheated steam is used, perhaps, and passed through holes in these platens, to be replaced a few seconds later by cold water, for the cooling operation. Alternatively, electrical heating elements may be inserted into holes in the platens.

The use of sudden extremes of temperature and enormous pressures in these moulding operations is an indication of the high quality of the steel from which the moulds and dies must be made. The dies and moulds must be made accurately, in some cases to one ten-thousandth part of an inch, of high grade carbon steel alloys, since the manufacturers cannot risk any possibilities of breakages and re-manufacture of the moulds by the use of an inferior steel. Further plates are placed outside the mould bodies to take and distribute evenly the pressure of the rams.

If the part to be moulded is very large or complicated, it is sometimes necessary to construct compound moulds. Wherever possible this system is avoided as it will incur more moulding lines on the finished article, which will add to the finishing labour, in addition to making ejection from the moulds more difficult. However, where such moulds are unavoidable the joints must be arranged vertically, that is in the same direction as ejection.

The liquefied plastic flows under the pressure throughout the mould, and that rather pleasing streamline effect, found more frequently now in plastic commodities, originates in the designing of moulds best suited to plastic flow, and in the strengthening requirements which such shapes satisfy. Some designers have, unfortunately, exaggerated this effect in an attempt to create modern designs.

The dies must be designed to allow the plastic to flow easily and quickly through



Making a meter case. The charged mould closing under 150 tons pressure.

all parts of the mould, and there should be no sharp corners to interrupt this flow. Any embossing or engraving required on the finished plastic part should be restricted to those surfaces facing the top or bottom of the mould.

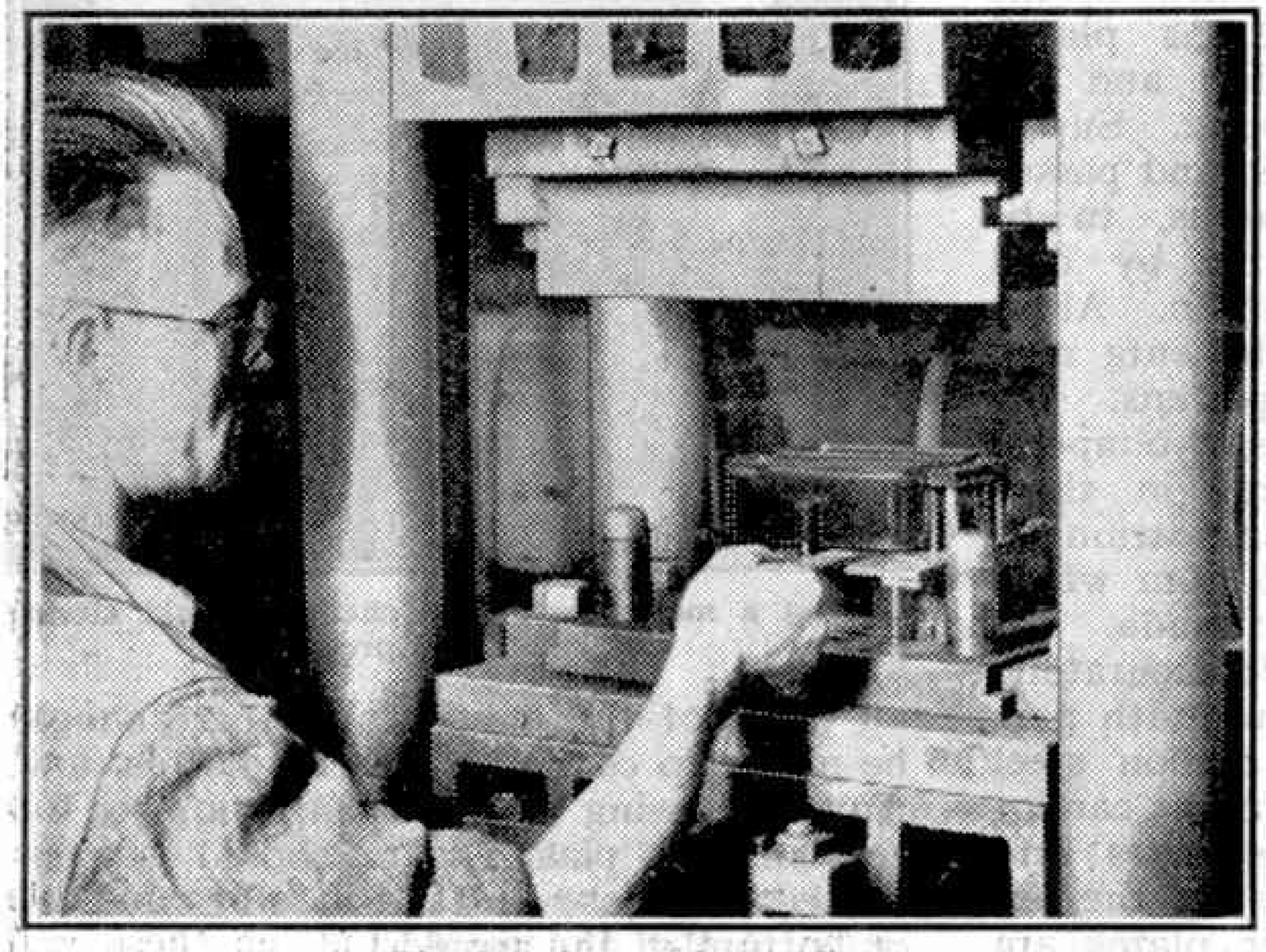
Obviously there must be no movable parts in the moulding void, as these will most certainly cause distortions in the material flowing around them. Sometimes metal inserts are required in the mould, but the number of these should be kept to a minimum.

Another consideration which affects the shape of the products arises from the ejection of the finished article from the moulds. It is necessary for the sides of the cavities to be slightly tapered in order to reduce frictional resistance as much as possible between the mould and the product, when it is pushed out of the mould. The bottom part of the mould can be designed to retain the moulding by very slight undercutting of the side walls. As allowed for by the designer, the plastic shrinks away from these walls in cooling, so that there is no difficulty in the ejection pin or plate pushing the moulding out of the highly polished mould from beneath, whereas the top mould is tapered to release the moulding immediately the press is opened. This is

the only case in which any undercutting of the side walls is advisable.

Should slight hollows be detected in the products, they indicate that insufficient pressure has been applied during the moulding operation and irregular shrinkage has taken place, or that the mould has been badly designed so that the moulding has excessive variations in thickness. The slight excess of moulding material forced out around the joint between the two parts of the moulding is known as the "flash," and is removed by cutting and buffing in the finishing process.

The finish of the surfaces of the moulds will of course be exactly reproduced by the mouldings; therefore it is vital, especially in the case of, say, plastic lenses, requiring optically correct surfaces, that highly polished surfaces are obtained. This necessitates careful hand polishing with litharge, and mopping.



Ejecting the cured moulding.

Thermo-plastic sheets may be moulded in compression moulds and drawn out into simple shapes under heat and pressure. Thermo-plastic blocks, or discs trepanned from sheets, may be pre-formed to the approximate shape and volume of the finished article by machining and then placed in the compression mould and pressed out in the ordinary way. The surplus material or "spew" forced out through special apertures in the dies may be ground down and re-used. Sheets and rods may be bent or twisted to any desired shape by the application of heat and pressure. When the materials cool off they will remain set in the new shapes.

Transfer moulding, which is an alternative to the direct method of compression moulding of thermo-setting plastics, differs by the means used of charging the mould with the moulding material. In this case the previous plastic moulding has been removed from the two parts of the mould and the mould has been closed tightly without the placing of the pellets or powder in the cavities, as for the normal compression mould. Instead, the powder is placed in a compartment which is joined to the mould cavities by means of small diameter tubes. Heat and pressure are applied to the powder and it is forced into the cavities. The action is calculated to be very rapid as the material must have completely filled the mould before the heat-hardening process begins to take place. This type of mould is more suitable than compression moulds for moulding a number of inserts.

Transfer moulding of thermo-setting plastics is closely related to the injection moulding of thermo-plastics. These "heat-softening" materials are obtainable in solution, powder, sheet, rod or block form. The sheet and powder forms may be shaped by compression moulding in a similar way to the heat-hardening resins, or the powder may be forced into the moulds through an injection press. This press converts the powder (or granules) into a liquid under high temperature and pressure, and forces it between the moulds which are then cooled. The moulds separate and the finished products are ejected.

For easy flow and removal from the moulds, the products are joined together by thin strips of plastic material. From a multiple die such products are ejected in the form of a "tree." The connecting strips are removed and, together with any rejects, are broken down into powder form for re-use. Some of the injection machines work automatically throughout, and I have known at least one machine that worked for a period of months, night and day, without stopping.

The method of extrusion common to both groups of plastics consists of forcing the treated resin through shaped holes immediately prior to the setting of the material. It is carried away on bands and dried in straight or curved forms, which, if required in large sections, may be hollow to save weight and material. Maximum sizes are gauged by the strength of the material necessary to retain the shape, and the minimum sizes are in the form of threads less than two-thousandths of an inch in diameter. Some such threads are claimed to be stronger and more elastic than silk, and are rapidly replacing that material for many purposes.

The extrusion of thermo-setting plastics is a far more difficult and intricate process. Only a small quantity of the material may be heated at one time owing to the rapid hardening of the resin; indeed, only a very small portion of the plastic can be subjected to the processes as it is drawn from the storage chamber and into the extrusion cylinder. It is forced by a ram along this cylinder, at a carefully pre-determined rate, under carefully calculated heat and pressure conditions, so that it passes through the extrusion aperture at precisely the right moment in its correct condition for hardening. Similar shapes may be extruded as for the thermo-plastics, namely, rods, tubes, etc.

Various plastic materials can be cast cold in forms suitable for carving, polishing, machining, etc. The moulds may be made of any convenient and cheap material such as wood, rubber, etc., by methods comparable with those of plaster casting. It is possible for the amateur to collect odd scraps of thermo-plastic material, such as old toothbrush handles, combs, pieces of Perspex, etc.; and in the following manner, by use of heat and a solvent such as acetone, added to the finely broken or cut up pieces of the plastic, new shapes may be moulded. The threads melt down more quickly in the presence of heat, in which state we now add a filler, such as wood flour, shavings, or even shredded scraps of paper or rag. Pour the mass into moulds, which should be tightly bound, and leave it to harden. When it becomes cool and the solvent has evaporated the mass will be hard enough to be removed from the mould, and carved, painted or polished as desired.

It will be realised that after the mouldings are removed from the moulds there are still a few operations required before they can be delivered to the consumer. These operations are carried out in the finishing shop. The flash, or spew—the surplus plastic forced out of the joint or special aperture—has to be removed. (*Continued on page 480*)

Engineering Notes

A Portable Gravel-Washing and Screening Plant

A range of portable gravel-washing, elevating, and screening plants combined with storage hoppers now being built by Frederick Parker Ltd., Leicester, is designed to permit a rate of haulage comparable with normal heavy road haulage trailers.

One of these plants, which is shown in the accompanying illustrations, was designed for and in collaboration with the Anglo-Iranian Oil Co. Ltd., London, for use in Iran.

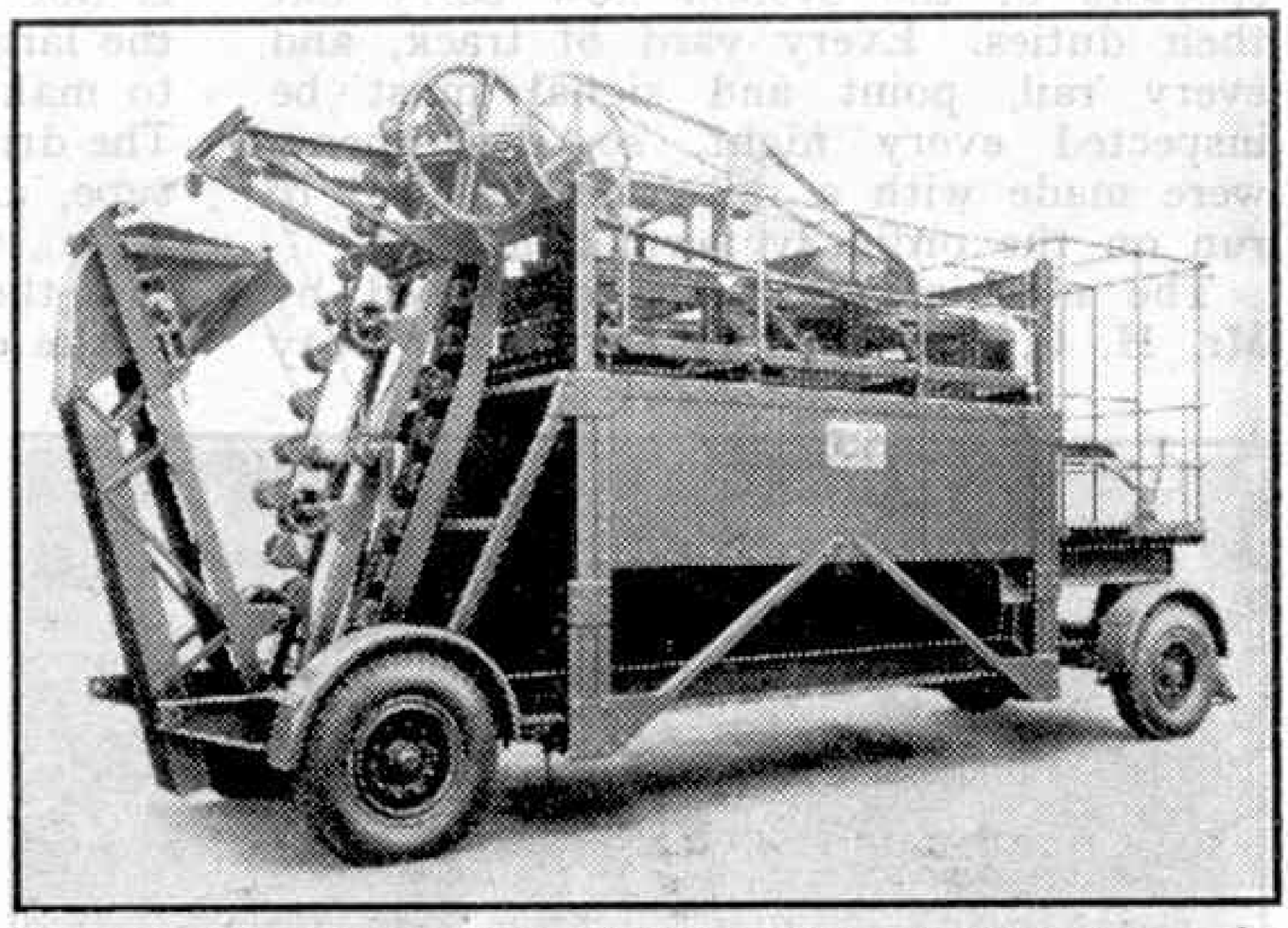
The plant comprises two main units mounted on standard pneumatic-tyred road wheels, and all the working parts that project are made retractable to give an overall travelling height of 12 ft. with a width of 7 ft. 6 in. The plant shown has an approximate output of 8 tons of washed gravel an hour, but similar plants having an output up to 20 tons an hour have been supplied.

The aggregate washing equipment has at its feed end a bucket elevator, the lower part of which may be raised and lowered through hand-operated pulley gear. The buckets are mounted on a chain driven by a sprocket wheel, and they pick up material from a spring-loaded boot at the bottom of their supporting frame. When in use this boot is lowered into a pit until its forward lip is at ground level and material is emptied straight down into it.

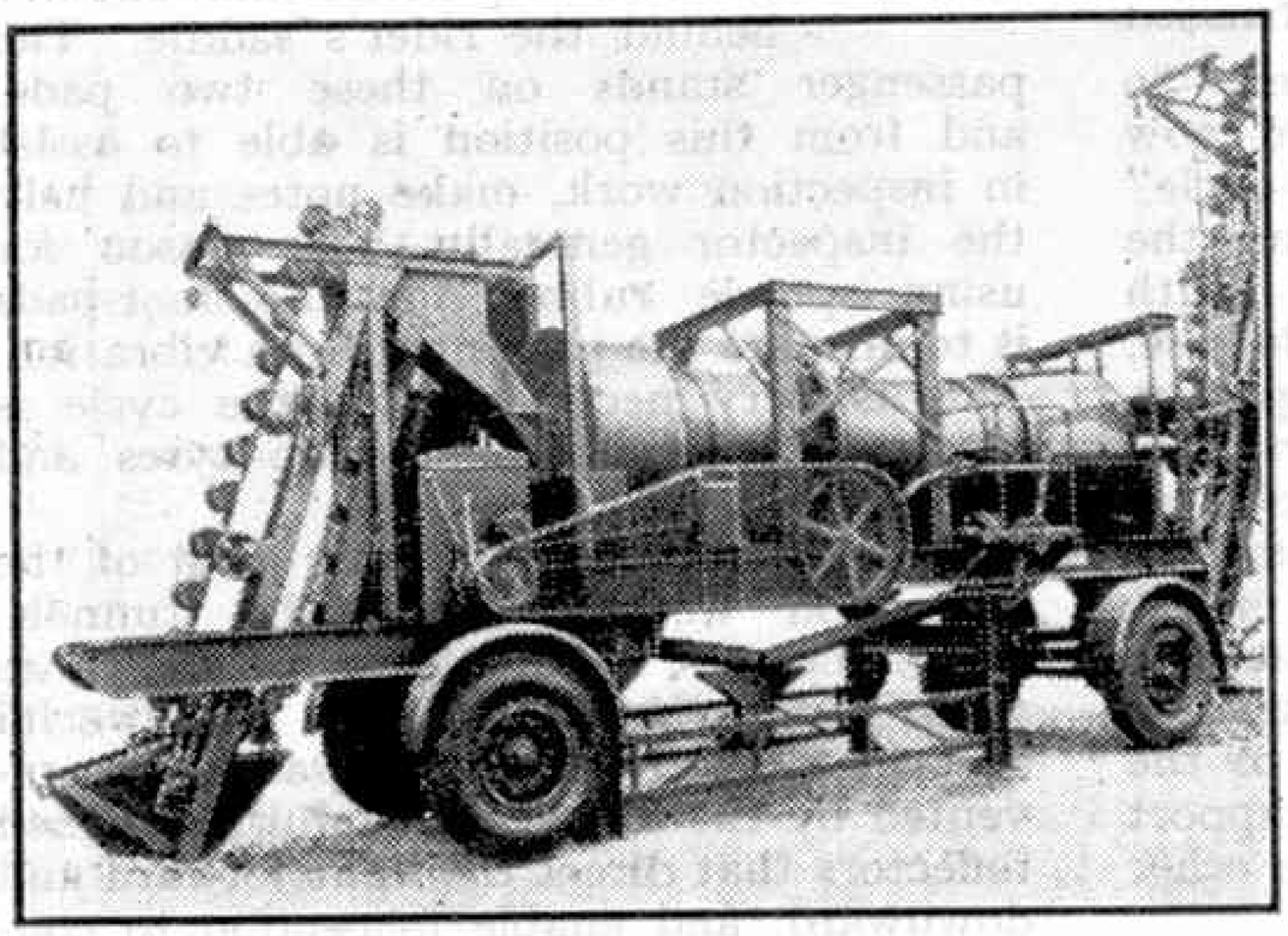
The elevator discharges into a chute leading directly into a rotating feed-box at one end of the washer. This feed-box forms the first compartment of the washer, and from it the material passes into a long washing cylinder, divided into two compartments and having a perforated steel end plate.

Within the cylinder steel baffles are welded in position. A perforated screen at the discharge end of the washer extracts sand and water from the material before it reaches the screening plant, which is shown in the upper illustration. Dirty water from the feed cylinder and sand and water from the final sand screen are discharged by chutes to a central point beneath the washer.

The power unit is a 12-16 b.h.p. Lister oil engine.



The elevating and screening unit of the gravel-washing and screening plant described on this page. This illustration and the one below are reproduced by courtesy of Frederick Parker Ltd., Leicester.



The gravel-washing unit of the Parker plant.

Life-Boat Named After Coxswain

The Royal National Life-boat Institution have decided to name their latest life-boat "*Henry Blogg*," after the famous Cromer coxswain. The boat is one of a new type, a 46 ft. Watson cabin life-boat in which, for the first time, the steering wheel is amidships instead of at the stern. She was sent to Cromer to be tested, and the crew like her so much that she will remain there.

Henry Blogg, who is now 70, has a record unequalled in the 122 years of the life-boat service. He has been in Cromer life-boat for 53 years, has been its coxswain for 37 years, and has taken part in the rescue of 873 lives. He has won the Institution's gold medal, the V.C. of the life-boat service, three times; its silver medal four times, the British Empire Medal and the George Cross.

Shield for Machine Operators

An interesting protective device consisting of a transparent shield that can be rapidly and easily fixed to any machine tool to protect the operator from flying chips of metal or dust has been introduced by the Silvaflame Company, Birmingham. The device consists of a small magnet of cobalt steel fixed to an adjustable arm that carries a shield of Perspex. The magnet can be fixed to any suitable point on a machine and by means of the special adjustments provided, the Perspex shield can be interposed rigidly between the operator and the material.

Radar Helps in Docking

When the "*City of Calcutta*" arrived at Capetown, South Africa, on a recent visit, she used her wartime radio and radar equipment to help her to dock in a thick fog and to speak from the bridge to the Post Office. The equipment is the standard type that was issued to thousands of British ships for convoy work during the war. The radio telephone saved much time and the pilot was speedily directed to the ship's side through dense fog. The vessel ran into fog about 30 miles from Capetown, but by using her radar she was able to pass safely to the harbour breakwater.

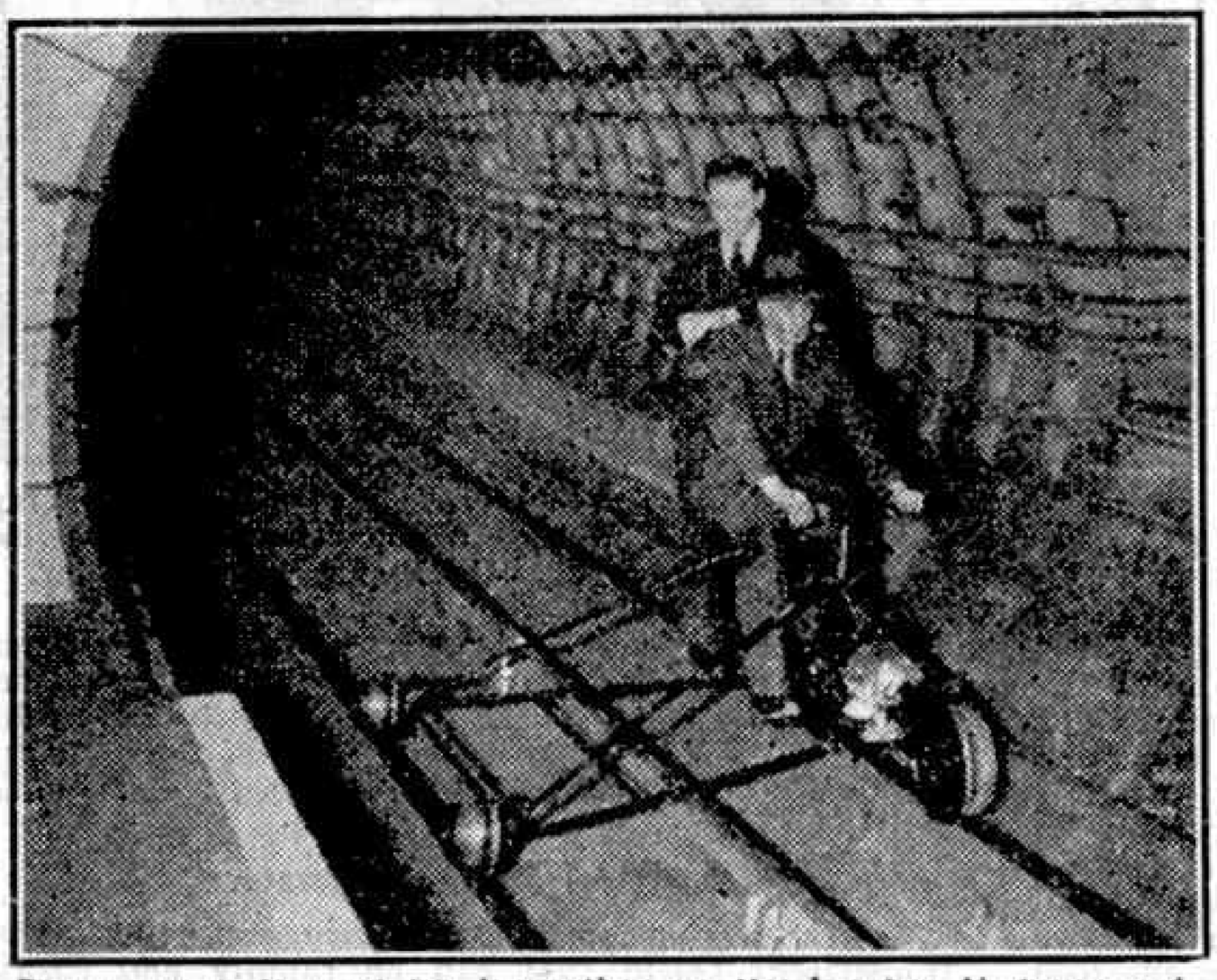
Cycling on the London Underground

A Novel Quad-Cycle

By T. R. Robinson

SPENDING the night cycling along the London Underground Railway tunnels may seem an odd occupation, but it is the way in which the line Inspectors of the system now carry out their duties. Every yard of track, and every rail, point and signal must be inspected every night, so experiments were made with a rail-cycle designed to run on the ordinary permanent way.

The machine used was developed by Mr. H. C. Trissler, the Permanent Way Divisional Assistant, and proved so successful that several more have now been constructed. It is a "quad-cycle" of distinctly novel appearance, and the tubular frame, which spans the width of the track when the cycle is in use, is designed to fold up very compactly, so that the machine can be stored in quite a small space. It is simple to assemble the cycle and place it on the rails, for the folded sections can be extended easily, and they are locked rigidly in place by a special interlocking joint. The extension then forms a kind of "outrigger" to the rest of the frame; the wheels that support it are considerably smaller than the other two.



The quad-cycle used for inspection on the London Underground. The passenger stands on rubber pads behind the driver. Photograph by courtesy of London Transport.

All the wheels of this novel cycle are flanged, and there is no provision for steering, for the simple reason that it is unnecessary. The position of the rider is at one side of the frame, but he is not seated directly over the track of the larger wheels, for this would be likely to make the machine overturn at bends. The drive is by chain of the familiar cycle type, and there is a gear ratio of about 33 in., which is very suitable for the work that the cycle is required to do.

The chainwheel, pedals, and saddle are all of the usual kind, but the handlebars are of a simple "T" form, with plain grips on their ends. The brake is unusual, for its curved shoe acts on the flange of the driven rear wheel. It is of the cantilever type, and is operated by a cable from a lever mounted on the handlebars. It is not designed to bring the machine to a halt as rapidly as the brake of a road cycle, but it does stop it in a very short distance.

As the rule of the road which forbids the carrying of two people on a cycle does not apply to cycling underground, provision is made on the rail-cycle for a passenger, and to accommodate him two sponge-rubber pads are fitted to the frame close beside the chain-sprocket and directly behind the rider's saddle. The passenger stands on these two pads, and from this position is able to assist in inspection work, make notes and help the inspector generally. The reason for using sponge rubber for the foot-pads is to insulate the passenger from vibration. This is very necessary, for the cycle is not provided with pneumatic tyres and is unsprung.

A good light is needed for most of the inspection work in the tube tunnels. As the current is cut off during the times when the cycle is in use, a powerful acetylene lamp is fitted. Dazzle is prevented by the fitting of carefully designed reflectors that direct the light forward and downward, and enable inspection to continue for long periods without eye-strain.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"CHAMPLAIN"

By Louise H. Tharp
(Harrap, 6/- net)

One of the greatest of all stories is that of the settling of North America by Europeans, chiefly from Great Britain, France and Holland, who braved Atlantic storms in their unwieldy and ill-equipped sailing ships to find new homes in the west. These settlements were not made without trouble, for the various countries concerned were always liable to break out into open warfare among themselves or with the Indians already dwelling there. Some of the earliest settlements failed, and great hardships befell others, but under the guidance of pioneer leaders the new lands were brought to prosperity.

This book tells the story of one of the greatest of these voyagers, whose name is fixed in our minds by that of a lake that figured largely in the subsequent struggles between British and French for mastery of North America. Samuel de Champlain was not only the discoverer of this lake, but also an explorer who among other feats helped to find sites for some of the earliest French settlements in what is now Nova Scotia and along the banks of the St. Lawrence, where he founded Quebec.

Champlain spent his early boyhood on the Breton coast, where he became a skilful chart maker and navigator while still a boy. His great longing to see the New World revealed by the voyages of Columbus, Cabot and their successors was not gratified until he was 36, but from that time until his death in Quebec 32 years later he was continually exploring the New World and making sketches and other records of all that he saw. The Indians fascinated him from the first, and whenever possible he made friends with them and did his best to help them. How he did this we read in this book, which tells us the story of his voyages and travels overland, of his successes, and of his disappointments, the greatest of which was his capture by an English expedition. Fortunately he was able to return to his beloved Quebec.

This fine story of a notable pioneer of Canada is authentic, including direct quotations from the writings of the hero himself, and the excellent illustrations include adaptations of Champlain's own sketches and plans.

"ROCKET TO THE MOON"

By Bruce Peril
(Faber, 7/6 net)

Mr. Peril has written a story in which the modern boy will revel, for it combines excitement and adventure with futuristic but reasonable science.

On the upper slopes of one of the least accessible mountains of the Pennine Range is a gigantic research laboratory, where experiments are being made with new fuels of capacity far beyond those of ordinary explosives. The ultimate aim of Professor Delius, the owner of the great laboratory, is to shoot off a rocket with sufficient power to reach the moon, but an international gang are so eager to learn the secrets of the new fuels that they are prepared to stop at nothing in order to steal them.

Into this strange struggle comes David Dolan, a young reporter, who aids Delius and his assistants in their fight. He plays a decisive part in foiling the vicious attacks made on the laboratory, narrowly escaping death in one assault, and he it is who first tracks down the man directing the attacks on behalf of the international gang, and then runs the chiefs of the gang themselves to earth in London. Then shooting the first rocket to the Moon provides a thrilling climax.

"LOCOMOTIVE ENGINEERS OF THE L.N.E.R."

By Ben Webb
(Ian Allan Ltd., 3/-)

This is described by the author as "an attempt to give some details about the men who design or have designed the locomotives of the L.N.E.R., to show their portraits, to record their careers and their achievements." In this object the book succeeds fairly well. It delves into the fairly remote past represented by the Fletcher and Stirling periods on the North Eastern and Great Northern Railways respectively. The important work of the two Holdens, father and son, on the Great Eastern Railway is given due attention, as is that of the locomotive officers of the North British and Great North of Scotland lines. The reigns of H. A. Ivatt and Sir Nigel Gresley at Doncaster bring us into modern times, and we end with a brief story of the recent Thompson regime. The illustrations on the whole are interesting, although the reproduction in some instances is not very satisfactory.

Copies are obtainable from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 3/- post free.

"SOLVING EARTH'S MYSTERIES"

By H. H. Swinnerton, D.Sc., F.G.S., F.Z.S.
(Harrap. 10/6 net)

Interest in the materials of which our world is made, and the nature of the living things that have existed on it since life first became possible, is never ending. Dr. Swinnerton has set out to make this story plain to boys and girls, and he has succeeded in making a real live book out of branches of science that can very easily be made to appear dry and unattractive.

In this exploration of the Earth's history we learn how different kinds of rock have been formed, follow the making of soil, and see how rivers and seas came into existence. There are many surprises for the young reader. For instance, few of us realise that vast mountain ranges have been pushed up into the skies from under the seas, in which they were laid down as sediments, and that they are on their way back again to the seas, broken up by frost and rain and carried down by glaciers and swiftly running streams. This cycle is clearly explained, after which we pass on to the story of animal life, passing through the successive ages of fishes and reptiles to that of the mammals of the present day, and the appearance of man himself.

There are 181 illustrations, most of them reproductions of photographs, together with a geological map in colour.

"VETERANS OF THE TRACK"

By H. C. Casserley
(Ian Allan Ltd. Price 1/9)

Mr. H. C. Casserley, who is well known to *"M.M."* readers as a railway photographer, here presents an interesting pictorial record of various old engines that are still, or were until recently, on the active list. He also contributes an interesting account of a selection of his grand old-timers. He has specialised in tracking down little known old engines, some of them in more or less remote districts, and the gem of his collection is "*McClean*," 90 years old and "still going strong" on a colliery line in Staffordshire. This is the oldest locomotive at work in this country, and possibly in the world.

Copies can be obtained from A.B.C. Locomotive Books Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 1/11½ post free.

Railway Notes

Locomotive News

Considerable numbers of Ministry of Supply "Austerity" 2-8-0 freight locomotives, many of which have been overseas on Army service, are at present stored near the Kent coast, at Kingham, G.W.R., also near Blisworth, L.M.S., and elsewhere. As already mentioned in these notes many engines of this type are at work on the Southern and L.N.E.R. systems. The L.N.E.R. have purchased 75 of the standard wartime saddle tank 0-6-0s built by various British firms. These are being classed "J94" and numbered 8006-80. The engines are at work on shunting or local freight duties from various sheds in Lincolnshire, Yorkshire and Lancashire as well as farther north.

On the L.M.S. the latest class "4" 2-6-4Ts built at Derby are numbered and allocated as follows: No. 2236, 24B, Rose Grove, Lancs.; No. 2237, 26A, Newton Heath; No. 2238-40, 27A, Polmadie, Glasgow.

No. 25277 "*Oberon*" of the former L.N.W. "Precursor" class having been withdrawn, the only two of those 4-4-0s now remaining are "*Sirocco*" and "*Greyhound*." There are 13 "Prince of Wales" class 4-6-0s remaining, No. 25818 having been scrapped.

Following on No. 500 "*Edward Thompson*", further L.N.E.R. "A2" 6 ft. 2 in. "Pacifics" with 250 lb. per sq. in. boiler pressure, painted green, are Nos. 511-513. These are named respectively "*Airborne*," "*Steady Aim*" and "*Dante*," so resuming the racehorse name series. At the time of writing the first two are stationed at Heaton, Newcastle, and No. 513 is at Doncaster. "*Diamond Jubilee*" and "*St. Simon*" are now rebuilt to the "A3" class and shedded at King's Cross. Their new numbers are 46 and 112 respectively. It is believed that only nine Gresley "Pacifics" remain in the original "A1" state, now "A10," retaining 180 lb. per sq. in. boiler pressure. These include the famous No. 4472 "*Flying Scotsman*," now No. 103.

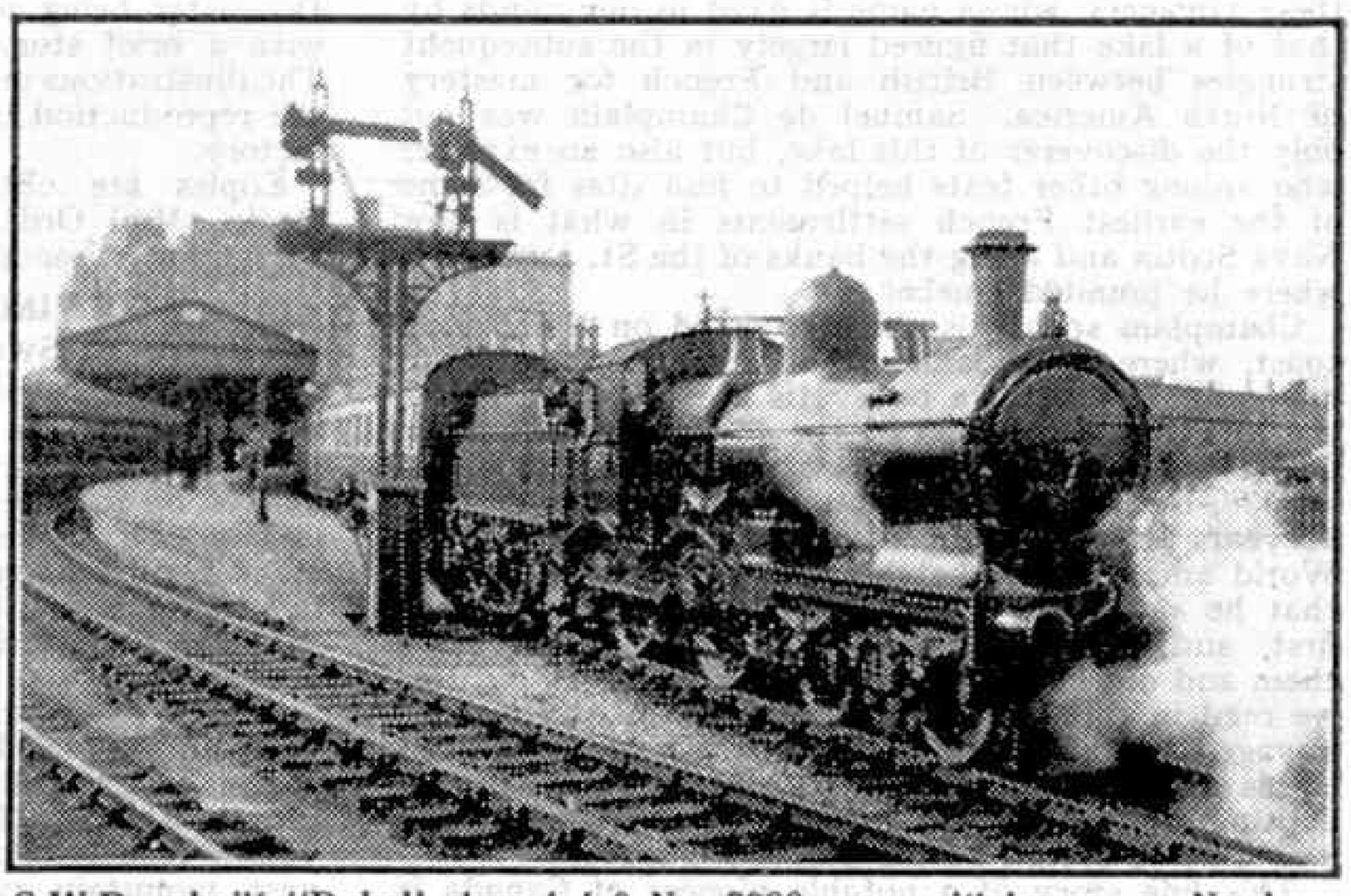
New standard L.N.E.R. "B1" 2-cyl. 4-6-0s have been completed at the works of the North British Locomotive Co. Ltd. up to No. 1071. Nos. 1040-59, with the exception of No. 1058, are allocated to the Great Eastern section, and the higher numbers so far reported to Neville Hill (Leeds), Sheffield or the Scottish area, where No. 1058 has been working. Many Great Eastern locomotives were recently awaiting repair. No. 9000, the new green 2-6-4T, has been continuing trials on semi-fast main line trains, including those on the 61½-mile Newcastle-Carlisle route.

The G.W.R. have turned out new "5100" 2-6-2Ts numbered 4140-2. The latest "Castle" 4-6-0, No. 7007 "*Ogmore Castle*," is stationed at Stafford Road, Wolverhampton. Nameplates have been affixed to 4-6-0 locomotives as follows; No. 1004, "*County of Somerset;*" No. 1005, "*County of Devon;*" No. 6923, "*Croxteth Hall;*" No. 6925, "*Hackness Hall;*" No. 6939, "*Calveley Hall;*" and No. 6940, "*Didlington Hall.*" Withdrawals include "Saint" 4-6-0 No. 2978, "*Charles J. Hambro*," shedded at Swindon, and Nos. 3000-1, the first two of the ex-G.C. R.O.D. type 2-8-0s which were purchased by the G.W.R.

On the Southern, "West Country" class engines are completed up to No. 21C 140, the series numbered 133-40 being allocated to Stewarts Lane shed, London, for running the Continental and ordinary Kent coast services as ready. Names for 10 of these locomotives now running are to be "*Dartmoor*," "*Exmoor*," "*Blackmore Valley*," "*Rough Tor*," "*Yes Tor*," "*Taw Valley*," "*Eddystone*," "*Lundy*" and "*Watersmeet*." These are all names of well-known beauty spots, landmarks or seamarks in the west. Engines on the withdrawn list include "F1" Stirling 4-4-0s Nos. 1079 and 1110; "A12" 0-4-2 "Jubilees" Nos. 600, 612, 613 and 615; "T1" 0-4-4T No. 4; and "D1" 0-4-2Ts Nos. 2220, 2240 and 2260. Light green paint is appearing on various passenger locomotives as well as on some of the 2-6-0s as they emerge from Works.

Oil Fuel Conversion Programmes

The four main line companies have announced their plans for conversion of batches of various classes of locomotives to oil fuel burning. On the L.M.S. there are to be 485, comprising the 11 class 7 2-8-0s on the Somerset and Dorset section, 245 class "8" 2-8-0s, 175 class "7" 0-8-0s, the 33 "Garratt" 2-6-0—



G.W.R. rebuilt "Duke" class 4-4-0 No. 3280, now withdrawn, on Newbury and Didcot train leaving Southampton terminus, S.R. Photograph by C. R. L. Coles.

0-6-2s, 16 class "4" 0-6-0s and five class "5" 4-6-0s. The L.N.E.R. plan to convert 450 locomotives, all of freight types, destined for work on many parts of the system. These will comprise 167 2-8-0s of classes "O1," "O2" and "O4," 111 "Austerity" 2-8-0s taken over from the Ministry of Supply, 91 "K3" 2-6-0s, 46 North Eastern type "Q6" 0-8-0s and 35 of the standard "J39" 0-6-0 type.

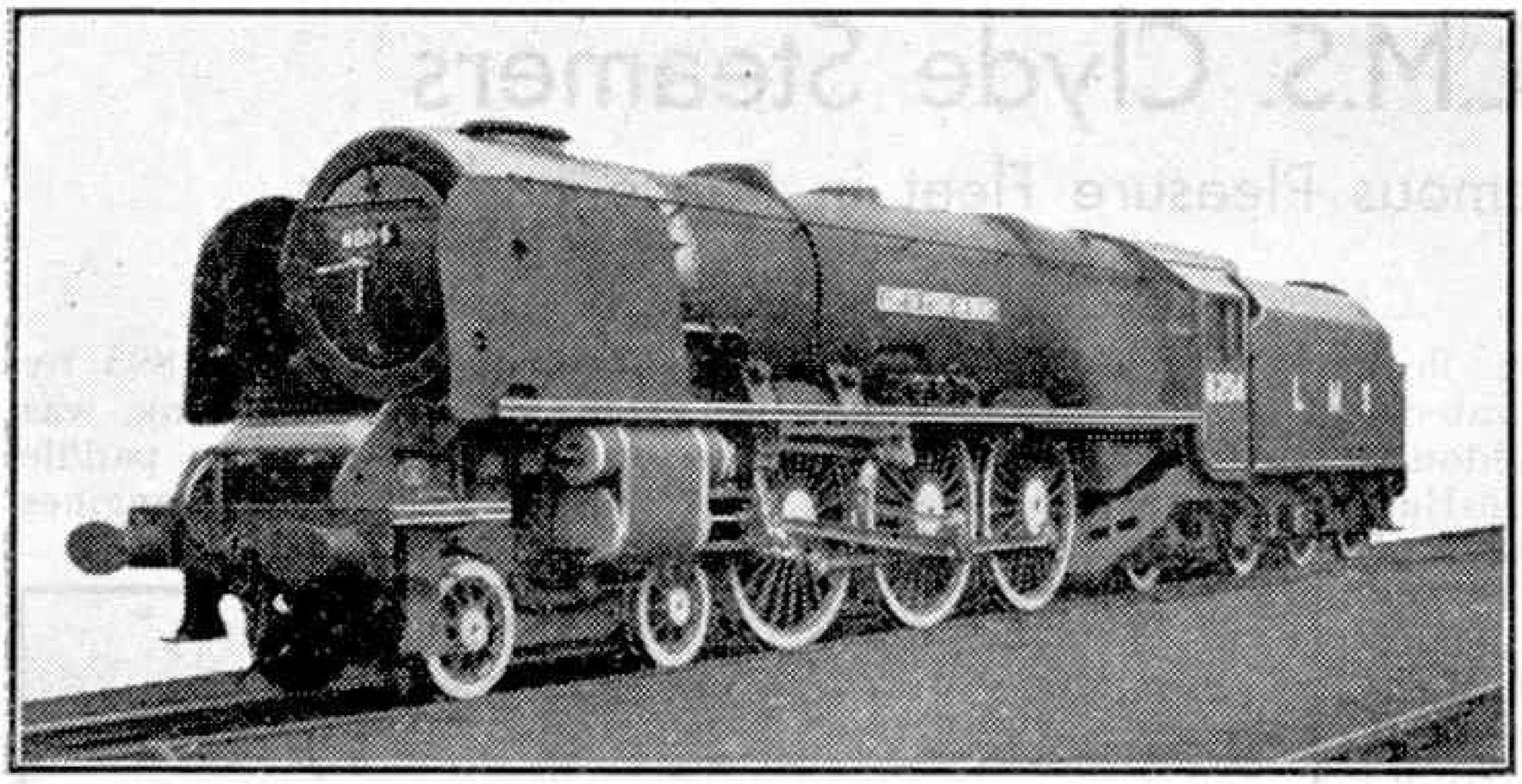
The G.W.R. intend to convert 50 "Castle" class express 4-6-0 engines, 85 "Hall" 4-6-0 mixed traffics, including the first trial one already reported, and 63 heavy freight locomotives of the 28xx class as well as 18 other goods engines, a total of 216.

Passenger engines figure largely in the Southern programme and they are all Western Division locomotives. In a total of 110 there are 16 4-6-0s of the "N15," "King Arthur," and "H15" types, the 10 large "D15" 4-4-0s, 20 of the "West Country" Pacifics, 30 "L11" and "T9" 4-4-0s, together with 34 of the "N" and "U" 2-6-0 classes.

In view of the large amount of construction work necessary at engine sheds as well as actual alterations of the locomotives themselves, some time will probably elapse before the whole of these plans come to fruition.

Improved Railway Services

The winter timetables that came into force in October indicated a further very marked step towards



L.M.S. No. 6254 "City of Stoke-on-Trent," in the new L.M.S. livery. Photograph by courtesy of the L.M.S.

restoration of faster and more frequent passenger services of the standard familiar in 1939 and preceding years. More restaurant, buffet, sleeping and Pullman cars are being run, seat reservations are again possible on certain fast trains, many intermediate stops have been eliminated, and accelerated timings have been put into force on many routes. There is still much to be done in the way of repair and maintenance work on locomotives and rolling stock after years of hard work in war conditions, when little could be done in the way of painting or renewal of worn parts.

The L.N.E.R. "*East Anglian*" and "*Yorkshire Pullman*," and the Southern Bournemouth Pullman and "*Golden Arrow*" are among the luxurious expresses already restored in which every seat is bookable. Services to the north of England, Scotland, the Midlands and West are being improved, and various through inter-company passenger trains appear in the timetables again.

L.N.E.R. Locomotive Performance

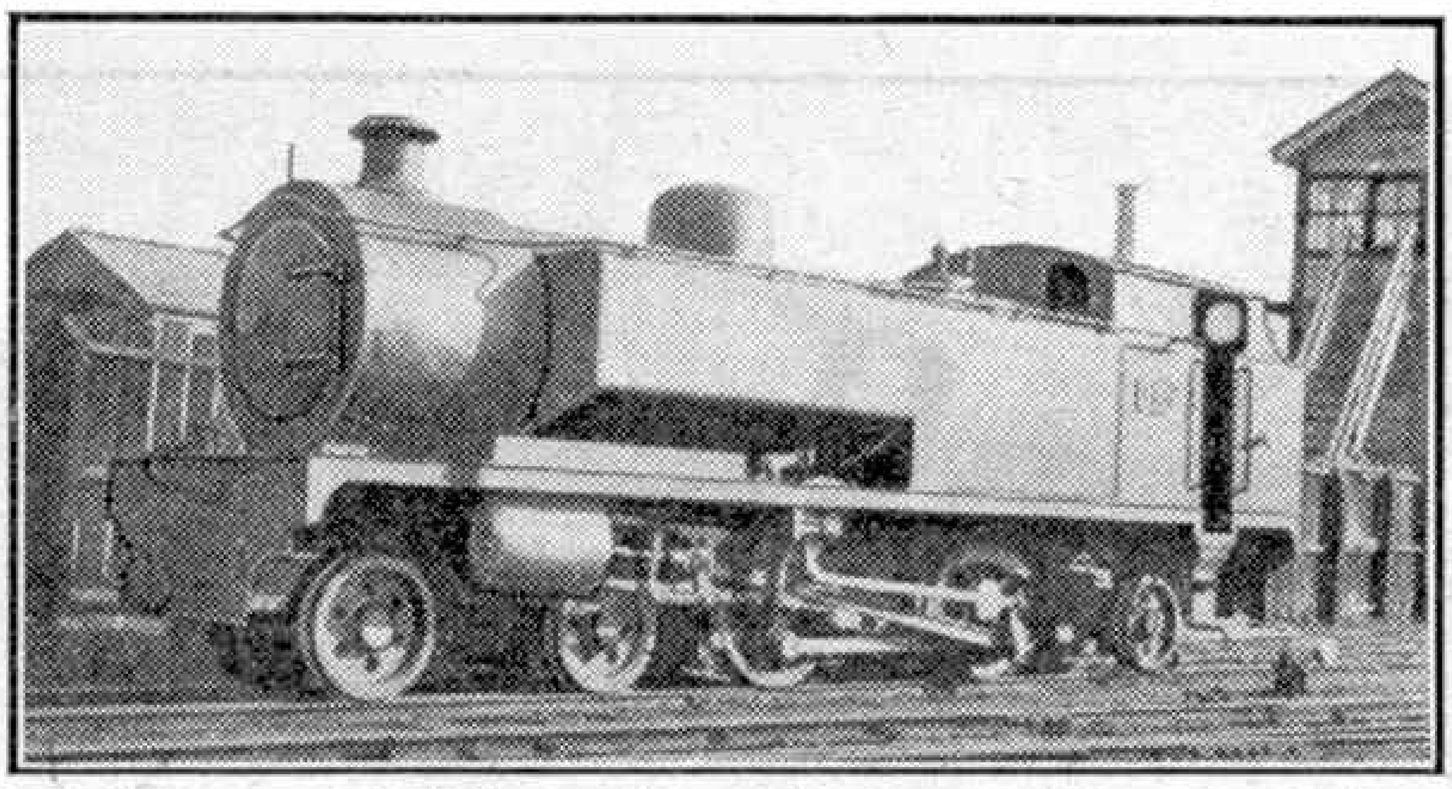
Not much has been heard so far about the performance of the "A2/1" 4–6–2 engines, Mr. Thompson's first new or rather modified "Pacific" design produced during the recent war. These are the four locomotives described in the April 1945 "*M.M.*" that were to have been the final "V2" 2–6–2s, but were given 19 in. instead of 18½ in. cylinders. They are provided with separate inside Walschærts gear for the third cylinder, and the outside cylinders are placed farther back, as in other Thompson types, while the boiler pressure is raised from 220 to 225 lb. Originally their numbers were 3696–9. These have now been altered to 507–10, and the engines are being given the Scottish names "*Duke of Rothesay*," "*Waverley*," "*Highland Chieftain*" and "*Robert the Bruce*." Two of these names were carried by former North British "Atlantics," while another N.B. 4–4–2 was "*Highland Chief*."

It was an interesting pleasure recently to receive some details of a good run by No. 3697 with King's Cross men when working the return half of a London-Grantham and back turn. They took over the first part of the up afternoon "*Scotsman*" at Grantham, with 14 coaches weighing about 485 tons gross and got the right-away 15 min. late at 7.28 p.m. The engine climbed well to Stoke, passed in about 9 min., and speed went up into the "eighties" down part of the famous descent towards Peterborough. Approaching this station there was the first bad signal slowing, and it was passed very slowly at 8.3, 16 min. behind time. Unfortunately more delays were to follow. First on the level at Connington South, and then on a 4½-mile rise at Abbots Ripton, signals caused bad checks, apparently on account of a fish train not turned on to the slow line soon enough. Thus at Huntingdon the train was 4 min. down on schedule, but was soon travelling in the "seventies" and averaging a mile a minute when on went the signals again, at Everton Box. A fine recovery was made, and approaching Hitchin at about 60 m.p.h. on the 1 in 264–200 up, the engine continued to climb well to Stevenage, so that on passing Hatfield at 9.10 all 8–9 min. lost by signal delays had been recovered. The 41¼ miles from Huntingdon, including Everton slowing, and a good deal of adverse grading, had taken only 41 min.

There was a long slack between Brookman's Park and Potters Bar, after which the descent through the suburbs and the approach to King's Cross were taken carefully, as is now usual. The final stop after a gentle draw along the platform was secured at 9.35. This was 5 min. down on the 122 min. allowance for the 105½ miles, though as delays had cost 13 min. the locomotive was 8 min. to the good, and the net time of 114 min. from Grantham was excellent in present conditions.

Northern Ireland Narrow Gauge Locomotives

We reproduce on this page a photograph by Mr. E. Patterson of a 3 ft. gauge 4–4–2T locomotive that was built by Kitson and Co. Ltd. in 1908 for the former Ballycastle Railway. This line was closed in 1924, but was subsequently taken over by the Northern Counties Committee (L.M.S.) The engine was then numbered 113, and with a sister locomotive numbered 114 was used for passenger working over the Ballymena -Larne section up to 1933, when passenger traffic on this route was discontinued.



A 3 ft. gauge 4-4-2T locomotive of the former Ballycastle Railway Northern Ireland. Photograph by E. Patterson.

L.M.S. Clyde Steamers

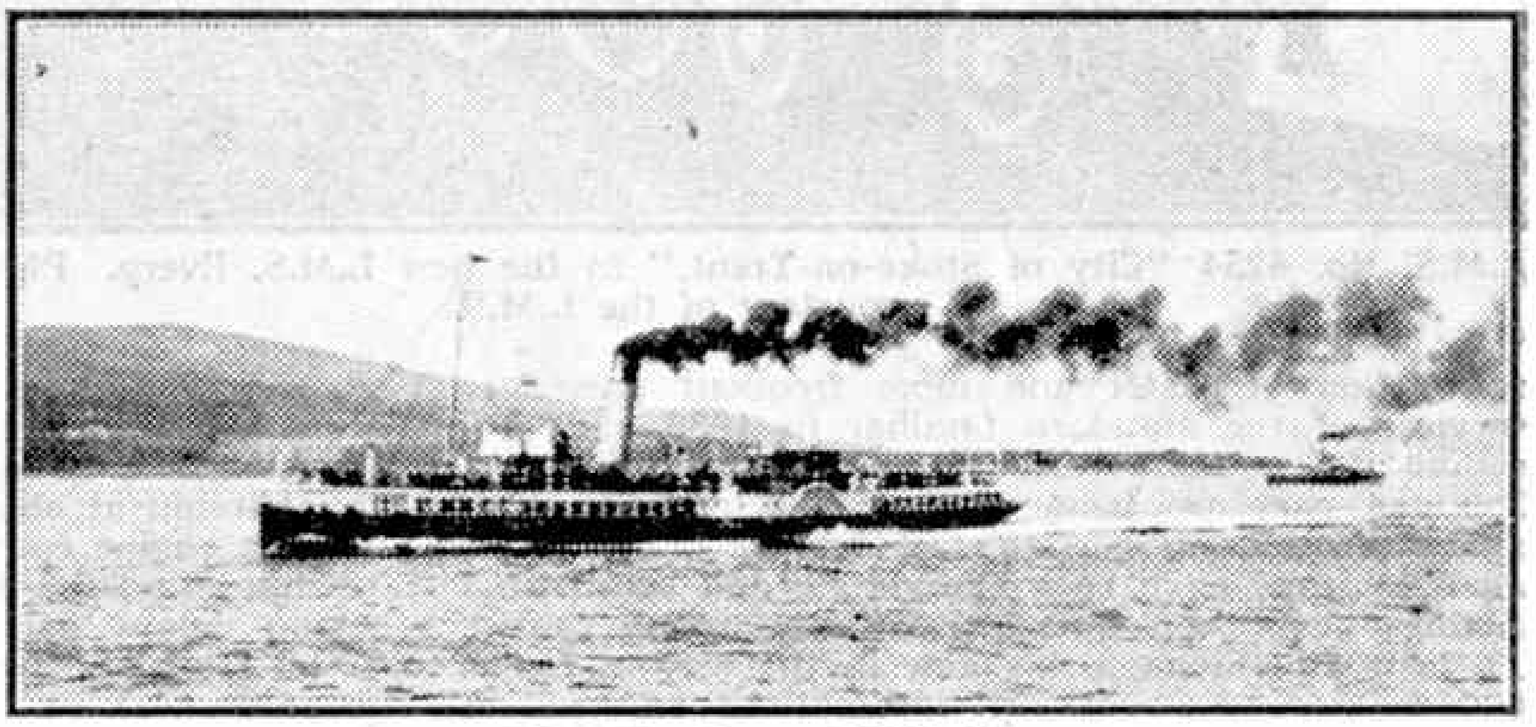
A Famous Pleasure Fleet in Peace and War

By W. A. C. Smith

IN 1939 the L.M.S. fleet of steamers on the Clyde was operated by two subsidiary companies, the Caledonian Steam Packet Co. and Williamson-Buchanan Steamers (1936) Ltd. The first of these was formed by the Caledonian Railway, and by 1938 all L.M.S.-operated steamers had been handed over to it. Williamson-Buchanan Steamers Ltd., together with Turbine Steamers Ltd., a company formed in 1900, were taken over by the L.M.S. and David MacBrayne Ltd. in 1935. The L.M.S. share of the steamers of this combination was transferred to the Caledonian Steam Packet Co., but in 1936 a new company, Williamson-Buchanan Steamers (1936) Ltd., was formed by the L.M.S. and received the former Williamson-Buchanan and Turbine Ltd. steamers from the Caledonian Steam Packet Co.

The colours of the Caledonian Steam Packet Co. are black hull with white upper section, white and varnished superstructure and yellow funnels with black tops. Williamson-Buchanan steamers had similar colours, except that the funnels were white with black tops.

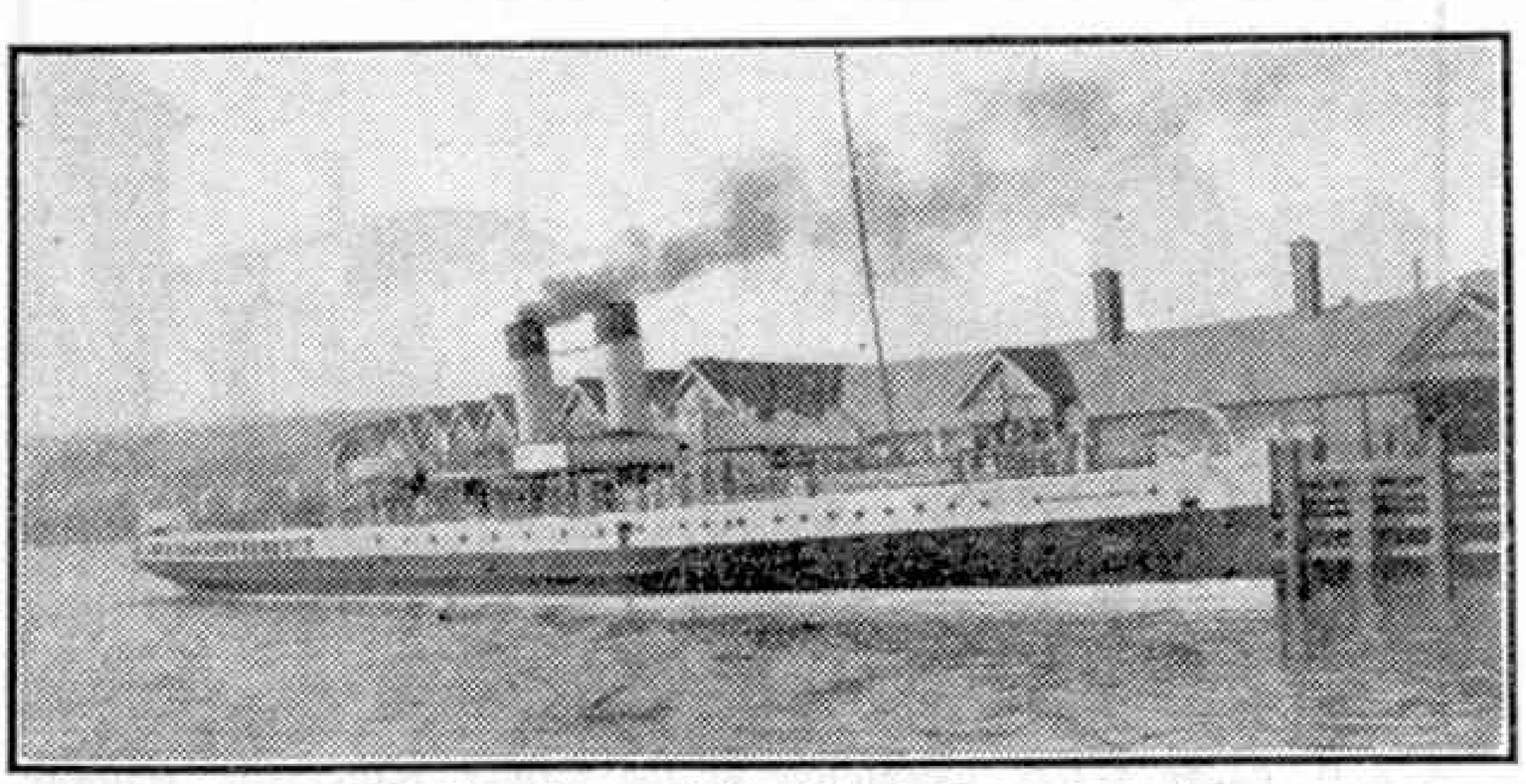
At the outbreak of war in September 1939 the Caledonian fleet consisted of 12 steamers and four motor vessels. The "*Duchess of Rothesay*," built in 1895 by J. and G. Thomson Ltd., Clydebank, was the veteran of the fleet. She is a paddle vessel powered by compound engines



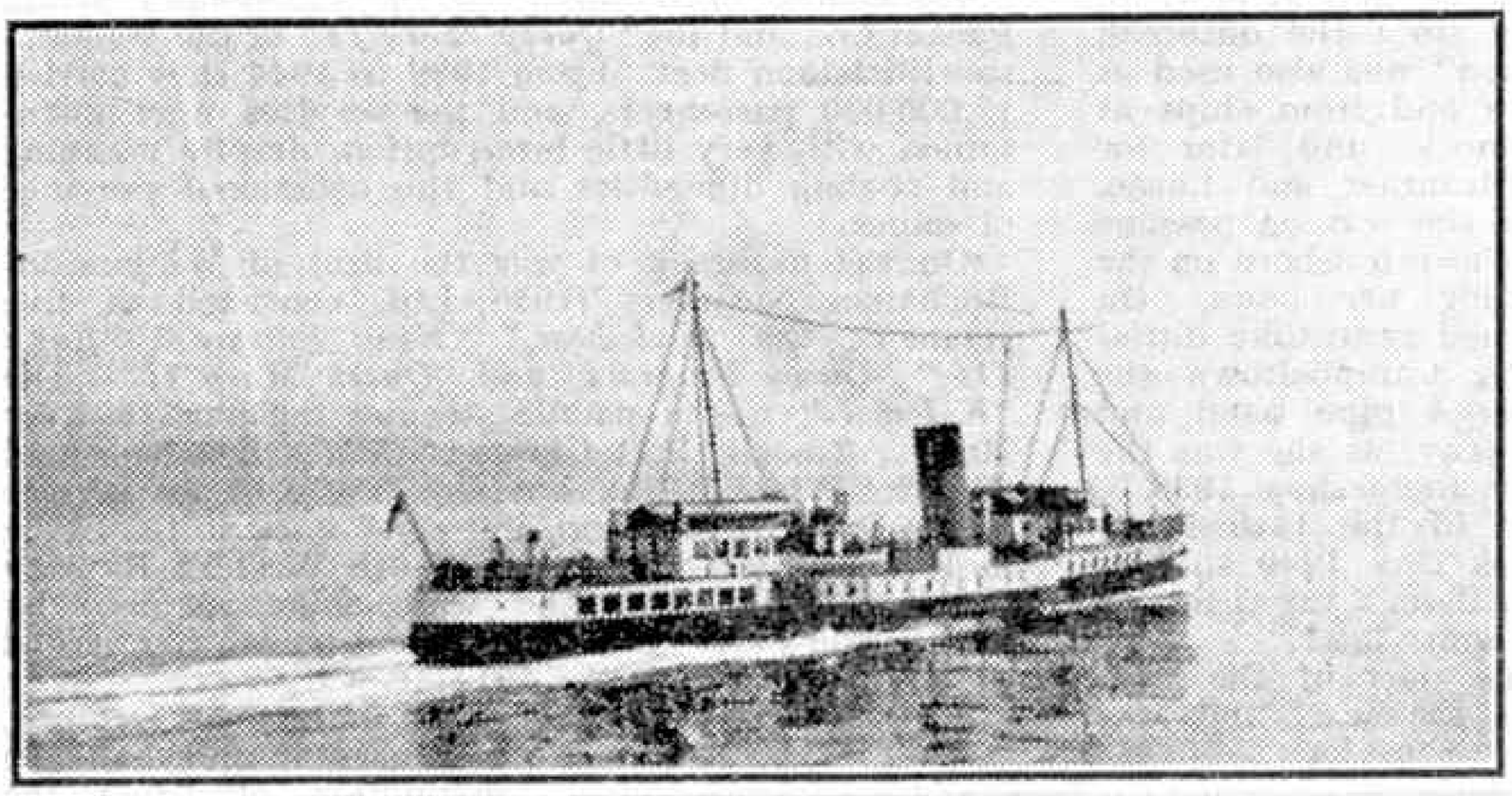
P.S. "Duchess of Fife."

giving a speed of 17 knots, and her length is 234 ft. In the First World War she was requisitioned as a minesweeper and gained distinction by towing into port the remains of a German Zeppelin which had crashed into the North Sea, sweeping up over 500 German mines and assisting in the salving of 14 vessels. In 1919 she was reconditioning at Glasgow when she sank at her moorings, and for several weeks she lay on the river bed with only her funnel top visible. The mystery was solved when it was discovered that her sea-cocks had been left open. A similar vessel, but with a triple expansion engine, is the "*Duchess of Fife*" built in 1903 by the Fairfield Shipbuilding and Engineering Co. Ltd., Glasgow, which also served as a minesweeper in the North Sea.

The only turbine steamer built for the Caledonian Railway was the "*Duchess of Argyll.*" She was built by Messrs. Wm. Denny and Bros., Dumbarton, in 1906, and is a fast steamer having a speed of almost 22 knots. Her length is 260 ft. In the 1914-18 war she sailed as a transport between the



T.S. "Duchess of Argyll" at Gourock.



P.S. "Marchioness of Lorne" leaving Gourock.

South of England and France, covering 71,624 miles and carrying 326,608 troops.

The *"Glen Sannox"* was the first vessel to be built after the First World War for the Clyde fleets. She is a turbine steamer with a length of 260 ft. and was built in 1925 by Denny's. She is the fastest Clyde steamer, and attained a speed of almost 24 knots on trial. In appearance she is very similar to the *"Duchess of Argyll."*

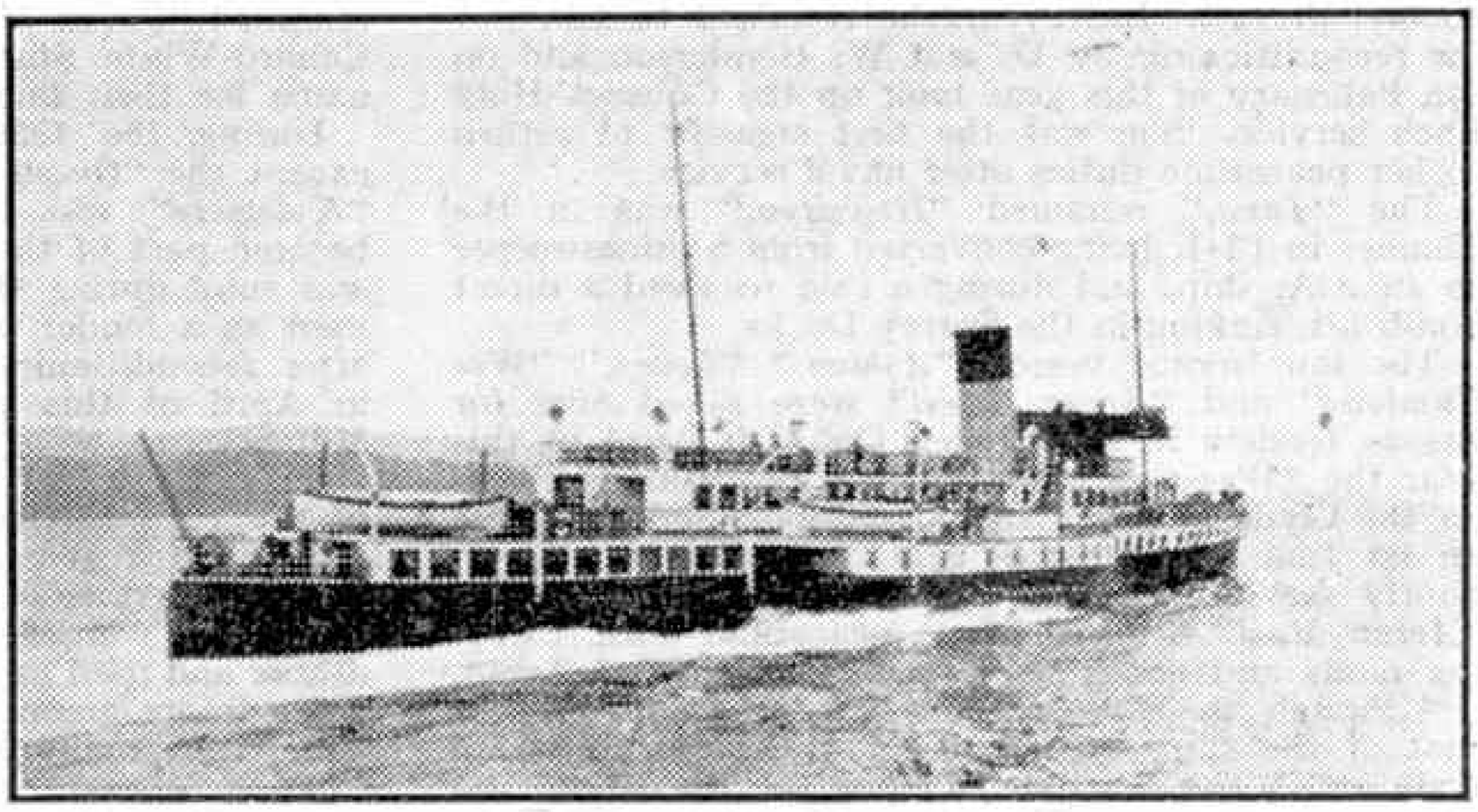
In 1930 a turbine cruising steamer was built for the Caledonian Steam Packet Co. by Denny's. This is the *"Duchess of Montrose,"* which has a length of 273 ft. and a speed of 21 knots. She carried saloon passengers only and was the first one-class ship in the fleet of the Caledonian Steam Packet Co. The *"Duchess of Hamilton,"* a similar vessel, was built for excursion work by Harland and Wolff Ltd. at Govan in 1932, and in 1934 the *"Mercury,"* a paddle steamer of new design, was built by Fairfield's. When viewed from certain angles the *"Mercury"* resembled a turbine steamer because of peculiar square paddle boxes, and other unusual features were a cruiser stern and two masts. A vessel very similar in design to the *"Mercury"* was the *"Caledonia,"* built by Denny's in 1934.

Other Caledonian steamers in 1939 were the *"Marchioness of Lorne,"* a small paddle steamer similar in appearance to *"Mercury"* and *"Caledonia"*; the *"Marchioness of Graham,"* the first geared turbine steamer in the Clyde fleets, which may be said to be a turbine version of *"Mercury"* and *"Caledonia"*; and the sister ships *"Jupiter"* and *"Juno,"* two paddle steamers built in 1937 by Fairfield's. In addition there were the *"Ashton," "Leven," "Wee Cumbrae"* and *"Arran Mail,"* all small motor vessels of similar design.

On the outbreak of war in 1939 many of these vessels were taken over for war service. Those that were paddle steamers became minesweepers, and later coast defence auxiliaries, while the turbine steamers and motor vessels were used as tenders. One of these was the *"Duchess of Rothesay,"* which became part of the 10th Minesweeping Flotilla at Dover. In 1940 she was transferred to the 12th Flotilla at Harwich and took part in the Dunkirk evacuation. In 1942 she became an accommodation ship at Brightlingsea. She has now been sold for breaking up.

The *"Duchess of Fife"* formed part of the 12th Minesweeping Flotilla and also took part in the Dunkirk evacuation. She made three trips to the beaches and brought back more than 1,000 troops. Last year she returned to the Clyde and, after reconditioning by Lamont's at Port Glasgow, took up her peacetime duties again on 30th May of this year.

The *"Duchess of Argyll"* was used as a tender for the conveyance of service personnel to and from ships at anchor in the Clyde, including the liner *"Queen Mary."* She returned to the Clyde services

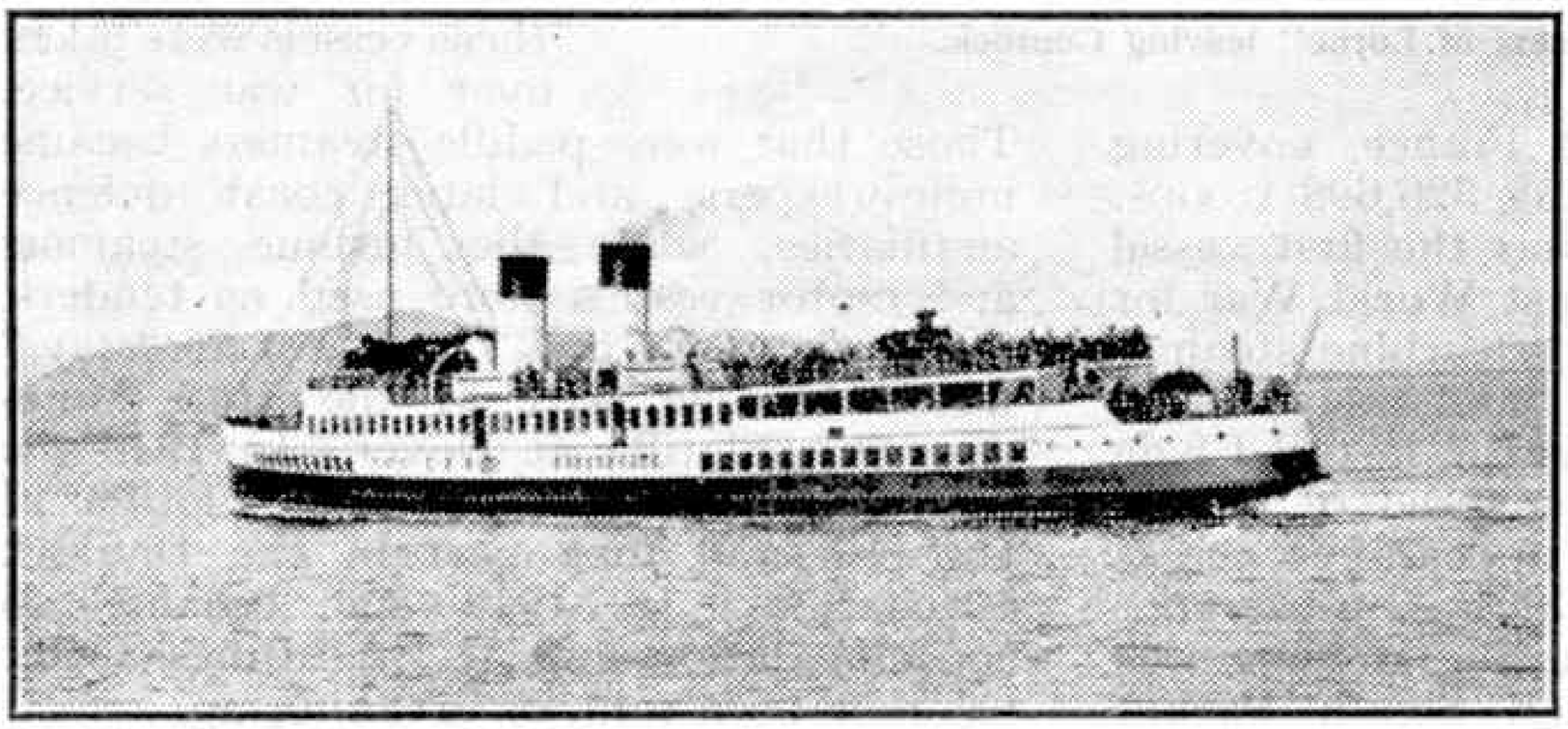


P.S. "Mercury."

more than a year ago and was the first steamer to sail from Gourock to Rothesay since the outbreak of war. The "*Duchess of Hamilton*" was also used as a tender for carrying troops to and from ships at anchor off Gourock and Greenock, and later for carrying servicemen between Stranraer and Larne. On 26th December of last year she was on passage from Larne to Stranraer when she ran ashore on the Galloway coast, badly damaging her bows. On 1st June of this year she resumed peacetime duties on the Clyde, and on reaching Campbeltown she received a great welcome from a pipe band and 3,000 people on the decorated quay, as she was the first passenger steamer to arrive there since 1939.

The "*Mercury*" became part of the 11th Minesweeping Flotilla. On Christmas Day 1940 she hit a mine off the Irish coast and, although taken in tow by the "*Caledonia*," sank four hours later.

The "*Caledonia*" also became part of the 11th Minesweeping Flotilla early in the war, and was renamed "*Goatfell*." After a short spell in the English Channel she operated off Ireland. She then went to the Thames and was converted from a minesweeper to an A.A. ship and took part in the defence of London. She then went to the Humber to assist in the defence of Hull and there shot down her first enemy aircraft. She was at the Normandy beaches on D-day and then went to Antwerp to assist in the destruction of the flying bombs which were being launched against that city. Early last year she returned to the Clyde for reconditioning by Denny's, and took up service on the Dunoon and Rothesay section on 17th May of this year.



T.S. "Queen Mary II."

The "*Jupiter*" also formed part of the 11th Flotilla and was renamed "*Scawfell*." She served as a minesweeper, escort vessel and A.A. ship, and took part in the Normandy landings, taking over the 128th American Task Force. She accounted for three enemy aircraft. Last year she returned to Glasgow for reconditioning by D. and W. Henderson and on 9th February of this year took up the Gourock-Holy Loch service. She was the first steamer to return to her peacetime duties after naval service.

The "*Juno*," renamed "*Helvellyn*," was in the Thames in 1941, being converted from a minesweeper to an A.A. ship, and during a raid received a direct bomb hit, sinking in the Surrey Docks.

The four motor vessels "*Ashton*," "*Leven*," "*Wee Cumbrae*" and "*Arran Mail*" were taken over for use as tenders in the Clyde. On 11th April of this year the "*Wee Cumbrae*" resumed peacetime services on the Clyde on the Largs to Millport service, while on 1st June the "*Ashton*" and "*Leven*" instituted an hourly service between Gourock and Dunoon. The "*Arran Mail*" is also back to peacetime work, carrying mails and goods between Ardrossan and Arran.

Although their record was not so spectacular as that of the ships on war service, the vessels which maintained the wartime sailings on the Clyde did just as fine a job. They were the "*Glen Sannox*," "*Duchess of Montrose*," "*Marchioness of Lorne*" and "*Marchioness of Graham*" of the Caledonian Steam Packet Co., and the "*Queen Mary II*" of the Williamson-Buchanan fleet. From 1939 to 1944 they carried 17,000,000 passengers, and the services were maintained with very little interruption, despite manning and coaling difficulties and the occasional presence of mines.

On the outbreak of war the fleet of Williamson-Buchanan Steamers (1936) Ltd. consisted of five steamers, the "*Kylemore*," "*King Edward*," "*Eagle III*," "*Queen Empress*" and "*Queen Mary II*." The "*Kylemore*" was a paddle steamer built in 1897 by Messrs. Russell, Port Glasgow. She had a length of 208 ft. While fitting out she was sold for service in the South of England, but came back to the Clyde in 1904 as the Glasgow and South Western Railway "*Vulcan*." In 1908 she was again acquired by Williamson's and given her original name. She served as a minesweeper in the 1914–18 war.

The "*King Edward*" was built in 1901 by Denny's, Dumbarton, and had the distinction of being the first commercial vessel to be propelled by turbines. She has a length of 250 ft. and a speed of 20 knots. In the First World War she conveyed troops between the South of England and France and also saw service at Archangel, being the last vessel of the British expedition to leave and having a very stormy passage to Oban.

The "*Eagle III*" was built by A. and J. Inglis, Glasgow, in 1910. She is a paddle vessel with a length of 215 ft. and a speed of 16 knots. When first put into service she proved very unstable and was withdrawn almost immediately for alterations. Since these she has proved completely satisfactory in this respect. She saw service as a minesweeper in the 1914–18 war.

The "*Queen Empress*" was built in 1912 by Messrs. Murdock and Murray, Port Glasgow. She is a paddle vessel propelled by compound engines giving a speed of 16 knots, and has a length of 210 ft. In the 1914–18 war she served as a minesweeper, troopship and ambulance transport. As the last she served in the White Sea and ran aground. She was to have been blown up to prevent her falling into Russian hands, but was refloated in the nick of time.

The most modern vessel in the Williamson-Buchanan fleet, and one of the most popular Clyde steamers, is the turbine "*Queen Mary II*." She was built by Denny's in 1933 and has a length of 250 ft. She was named "*Queen Mary*" when launched, but was renamed "*Queen Mary II*" when the directors of the Cunard-White Star line wished to use the original name for their liner.

During the 1939–45 war all of these steamers, except the "*Queen Mary II*," saw war service. The "*Kylemore*" was requisitioned by the Navy and became part of the 10th Minesweeping Flotilla. She was sunk during the war. The "*King Edward*" was used as a tender on the Clyde during the war, and after reconditioning, returned to the Clyde services in April of this year on the Wemyss Bay-Largs-Millport run.

The "*Eagle III*," renamed "*Oriole*," became part of the 12th Minesweeping Flotilla and took part in the Dunkirk evacuation. When she arrived off the beaches there were no small boats to ferry the troops out to the waiting ships, so she was deliberately run ashore and used as a pier. In this way she distributed 3,000 troops among the vessels in the offing, although being continually bombed. She was refloated in the evening, during continuous air attack, and brought back 700 soldiers and nurses. She then took up minesweeping duties (*Continued on page 480*)

Photography

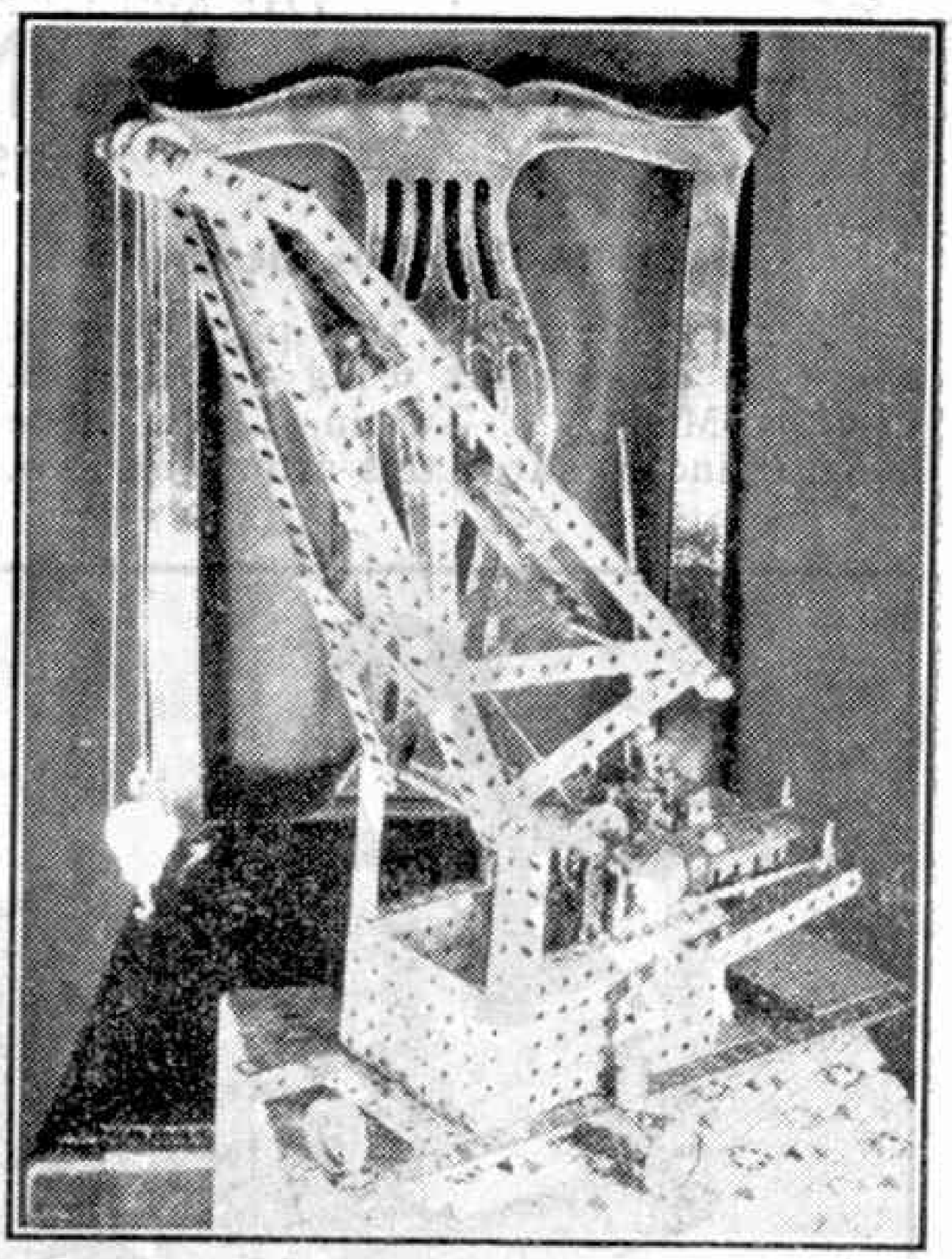
Meccano Models

NOW that the long evenings are here again, Meccano enthusiasts will be busy building models for entry in the "*M.M.*" competitions. In order to take part in these competitions it is necessary to send in either a photograph or a drawing of the model that is to be entered. It is not easy to make a satisfactory drawing of a model, and therefore it is best to send a photograph if at all possible. Fortunately it is quite easy to make suitable photographs, provided that a few simple precautions are taken. If the camera has focussing adjustments for photographing objects at close quarters, this is an advantage, but owners of box-form and other non-focussing cameras can make "close-ups" of their models by fitting over the lens a second or supplementary lens, commonly known as a "portrait attachment," which may be purchased from a photographic dealer.

If the work is to be done out of doors, the model should be placed where it is in good light, but is not exposed to direct sunlight. Indoors it is necessary to place the model close to a window in order to secure sufficient light, but here again the sun should not be shining full on the windows.

Generally speaking it is best to photograph models indoors by artificial light. If only a single overhead electric or gas light is available, the model should be placed in such a position that the light falls on it from the front at an angle of about 45 degrees. If a second light, such as a table lamp, is available, this is a great advantage, and it should be placed a little to one side and slightly in front of the model. In order to avoid heavy shadows it is best to use opal or pearl electric globes.

Wherever the photograph is to be taken, a plain background of some kind must be provided. The importance of this cannot be over-emphasised, for large numbers of photographs submitted in "*M.M.*" competitions are quite hopeless on account of neglect of this precaution. Sometimes when a model is photographed out of doors the result is utter confusion, the model being mixed up with foliage, trelliswork, or brickwork behind it. This applies also to photographs taken indoors, and a typical example of a spoiled picture due to an unsuitable background is shown in our upper illustration. Here is a really good photograph ruined simply because the photographer failed to place a sheet of plain white or brown paper behind and underneath the model.



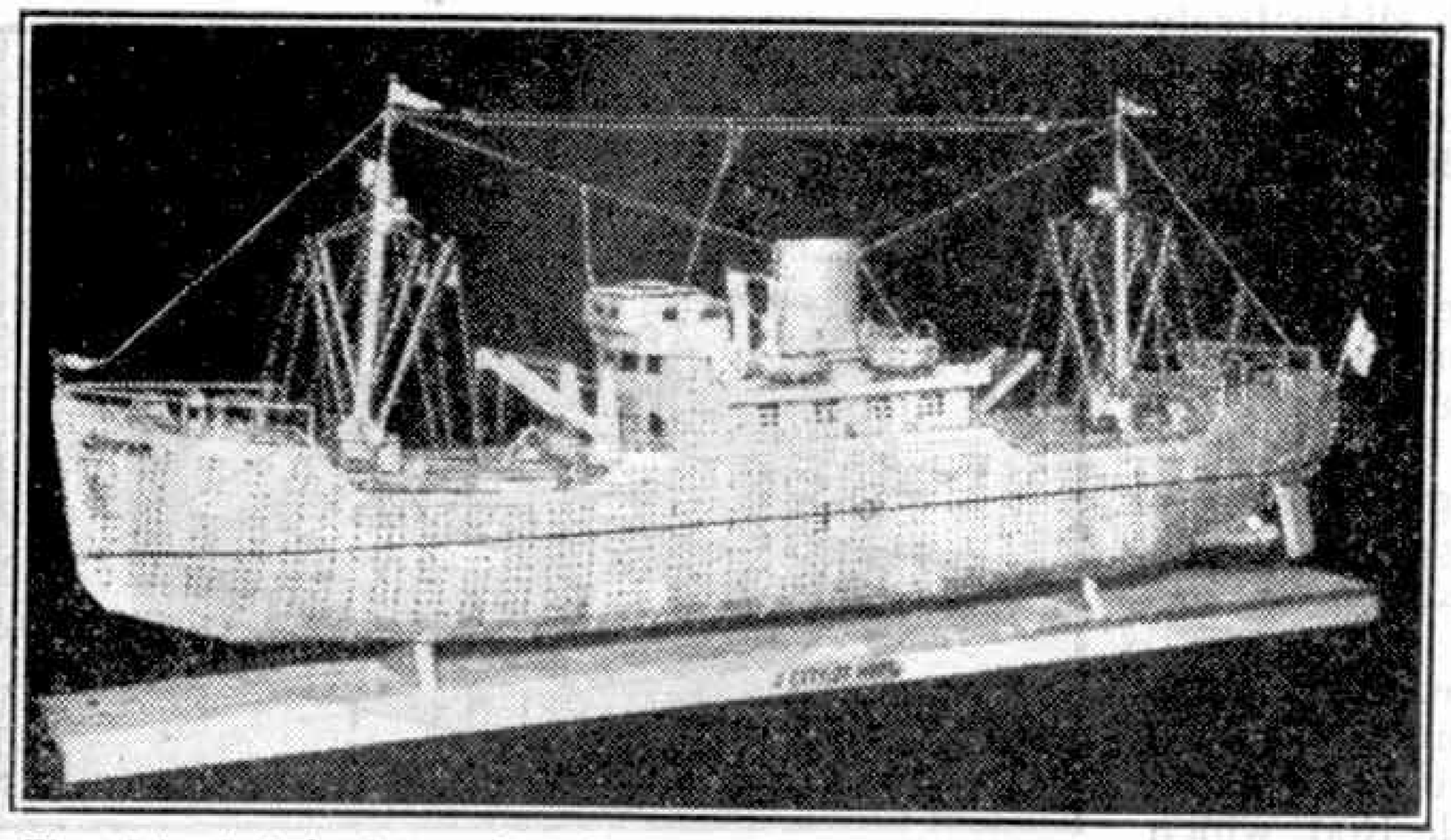
An example of an otherwise good photograph ruined by an unsuitable background. Compare this picture with the one below.

In all cases, indoors or outside, a sheet of some material entirely without pattern should be hung behind the model. The colour of this sheet may range from light brown to grey or white.

Another important point is to avoid dark shadows behind the model. This may be done quite easily by arranging sheets of white paper so as to reflect light on to the dark portions.

Every part of the model should appear equally "sharp" in the photograph, and to secure this result the lens should be "stopped down"—that is the movable diaphragm attached to the lens should be closed up to F32 or F64, or to its smallest aperture. This unfortunately has the effect of requiring a much longer exposure. Lighting conditions vary so greatly that it is impossible to give definite advice regarding exposure, and readers are recommended to use an exposure meter.

Prints for submission to a model-building competition should be made on glossy gaslight paper. Pencil should not be used on the prints to draw attention to certain parts, unless it is possible to submit at the same time a second print without such marks. The best plan is to gum to the top back edge of the print a piece of tracing paper of such size that when pulled over it will completely cover the front of the print. Any figures or identification letters may then be marked on this paper.



The plain dark background against which this fine ship is photographed shows up its details to the best advantage.

Among the Model-Builders

By "Spanner"

Novelty in Gear-Box Design

The illustrations on this page show a new type of gear-box using a suggestion sent by Mr. C. J. Turpin, Luton. The designer incorporated this arrangement in

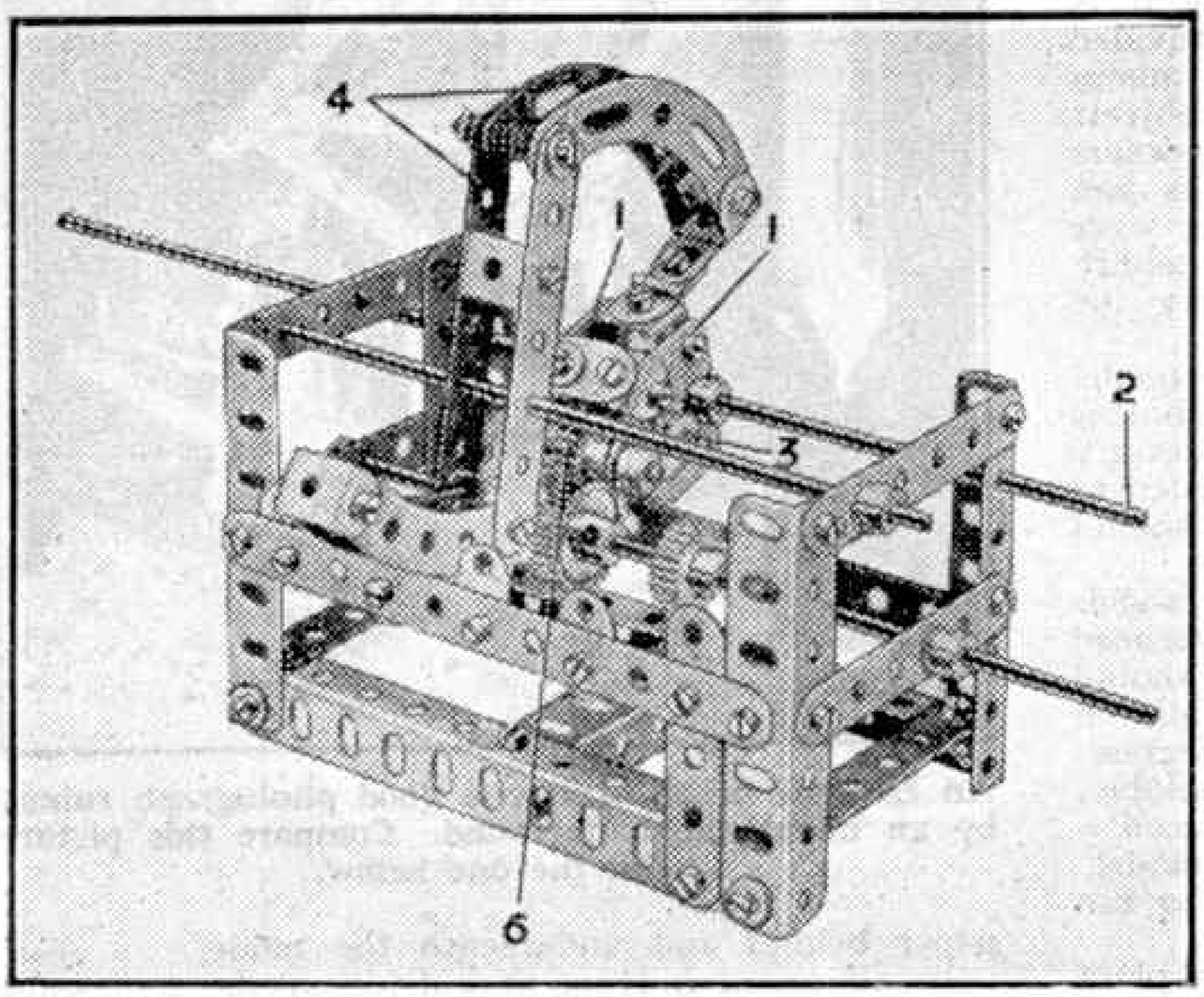


Fig. 1. A model gear-box based on a suggestion sent by C. J. Turpin, Luton.

a model lathe for the purpose of varying the ratio of the running speeds between the mandrel and the leadscrew.

Two Flat Trunnions form the bearings for three ½" × ½" Pinion wheels, which are constantly in mesh with each other, and which make up a form of selector gear. The ½" × ½" Pinion 5 is locked to the 11½" Axle Rod 2, which slides freely in the vertical 3½" Angle Girders. The centre ½" × ½" Pinion is supported by a 1½" Axle Rod 3, which is passed through the middle holes of the Flat Trunnions and held in position by Collars. The third Pinion 6 is fitted in a similar manner, using the holes at the tapered ends of the Trunnions as bearings. This selector unit can be moved longitudinally so that Pinion 6 can engage any one of four gears mounted on a 6½" Axle Rod.

The selector is moved by means of a gear-lever mechanism 4. Two 3½" Strips spaced by Double Brackets are pivoted on a 6½" Axle Rod, which passes through their third holes. The handle of the lever is formed by two 2½" Strips bolted to the ends of the 3½" Strips and spaced by another Double Angle Bracket. Flat Brackets are bolted to a 5½" Strip and adjusted so that they form a positioning rack for the lever arm.

The gears on the 6½" Rod are a ½" × ½" Pinion, a ¾" × ¼" Gear and a 50-teeth Gear.

Interesting Steering Mechanisms

Mr. P. E. Webb, Camberley, Surrey, has several interesting suggestions for steering gears suitable for model vehicles. One of his arrangements is shown in Fig. 3 on the following page. The mechanism is constructed as follows. Two Angle Brackets are bolted to the inner faces of two Bush Wheels and are pivotally connected by a 1" Axle Rod 2 to the ends of 5½" Strips, which are spaced by Double Brackets.

The tracking is effected by another 5½" Strip, each end of which is connected by a lock-nutted bolt to an Angle Bracket 3 that again is pivotally connected to a second Angle Bracket 4 attached to the Bush Wheel. The Rod 5 forming the steering column is linked to the tracking Strip by a Crank, the arm of the Crank being connected to an Angle Bracket and lock-nutted.

A second suggestion from Mr. Webb is shown in Fig. 4. In this construction

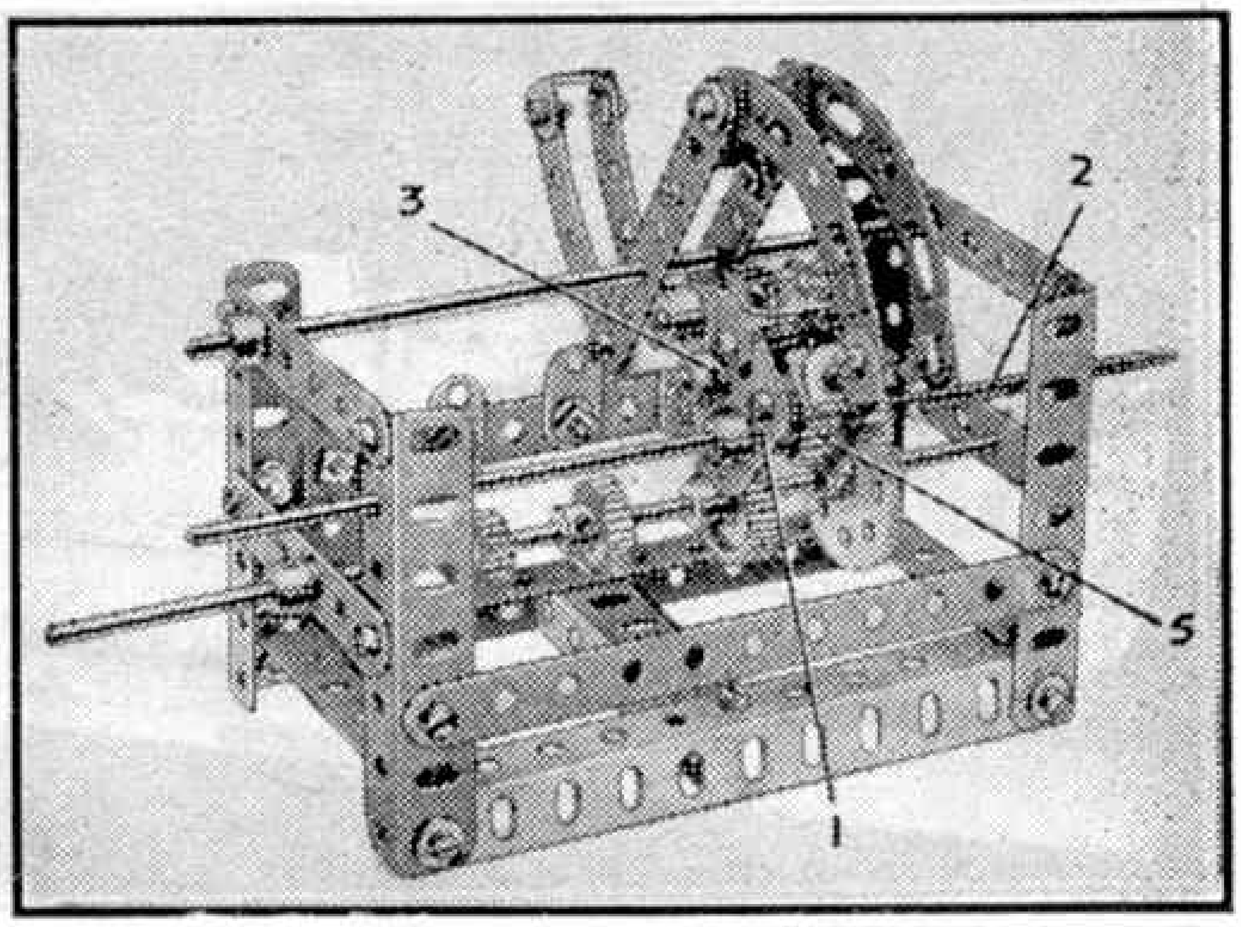


Fig. 2. Another view of the Turpin gear-box.

$1\frac{1}{2}'' \times 1\frac{1}{2}''$ Double Angle Strips are bolted across the centres of two Bush Wheels. Two $5\frac{1}{2}''$ Strips are bolted to the ends of these Strips and lock-nuts are fitted so that they are free to rotate about the Double Angle Strips. The two $5\frac{1}{2}''$ Strips are held apart by a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2 bolted to their middle holes.

The track bar is a $5\frac{1}{2}''$ Strip, each end of which is attached to an Angle Bracket 3 by lock-nutted bolts 4 that act as pivots. An Obtuse Angle Bracket 5 is bolted to the tracking bar and its slotted hole is attached to the end of a Crank so that it may rotate freely. An Axle Rod is locked in the boss of the Crank and is supported in an Obtuse Angle Bracket at one side and a Flat Trunnion at the other. The constructional details may be varied to suit the parts available.

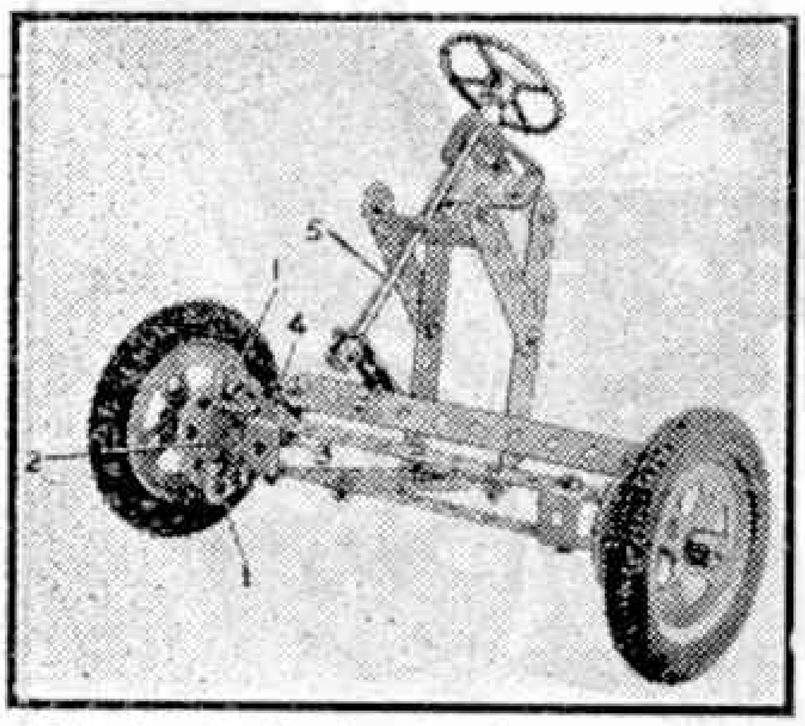


Fig. 3. A simple steering gear designed by P. E. Webb, Camberley.

A Practical Meccano Coil Winder

The bottom illustration on this page shows a useful coil winder that is in practical daily use in radio repair work at a radio service depot in Yorkshire. It was designed and constructed by Mr. R. Young, Wise Radio Depot, Filey. The machine is made of standard Meccano parts with the exception of the electric driving motor, and is fitted with automatic counters that record the number of turns wound.

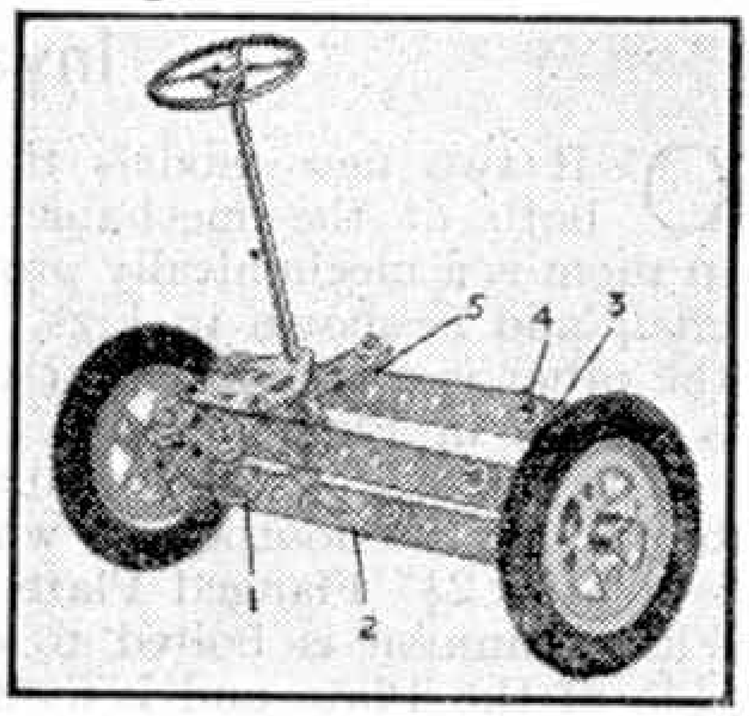


Fig. 4. Another of P. E. Webb's steering mechanisms.

The feed rate of the winding guide for the wire is adjustable to suit the particular gauge of wire in use. For this purpose a gauge indicator is provided, and when this is set in the appropriate position it ensures that the feed rate is suitable. The drive is obtained through a friction type variable speed mechanism.

A tapped mains resistor is used in series with the motor to adjust the driving power.

"Autumn" Model-Building Contest

During the long autumn and winter evenings Meccano becomes even more exciting. Meccano boys then settle down to work in real earnest, looking round for "new worlds to conquer," and that is one reason why I expect a bumper entry in this month's special model-building competition. Another reason is that models may represent any desired subject and may be constructed from any size of Outfit or number of parts.

Readers of any age living in the British Isles or Overseas can take part in this competition, and I advise all who enter to try to incorporate in their models some ingenious use for a Meccano part or some novel movement. Models displaying originality of this kind, no matter how simple they may be, will stand the best chances of winning the prizes.

When the model is complete a photograph of it should be prepared, but if this is not possible a good sketch will do. The competitor's age, name and address should be written on the back of the illustration, and it should be sent, together with a brief description of the model, to "*Autumn Model-building Competition, Meccano Ltd., Binns Road, Liverpool 13.*" That is all there is to do, but it should be noted that every model submitted must be the competitor's own work. The closing date in the Home Section is 31st December, but the Overseas Section will remain open until 30th April, 1947.

The following prizes will be awarded for the most interesting and well-built models submitted: First, Cheque for £2/2/–. Second, Cheque for £1/1/–. Third, Cheque for 10/6. There will also be a number of consolation prizes and Certificates of Merit.

Competitors who would like to have their photographs or drawings returned to them after the entries have been judged should enclose a stamped addressed envelope for that purpose. Photographs or drawings of prize-winning entries will not be returned.

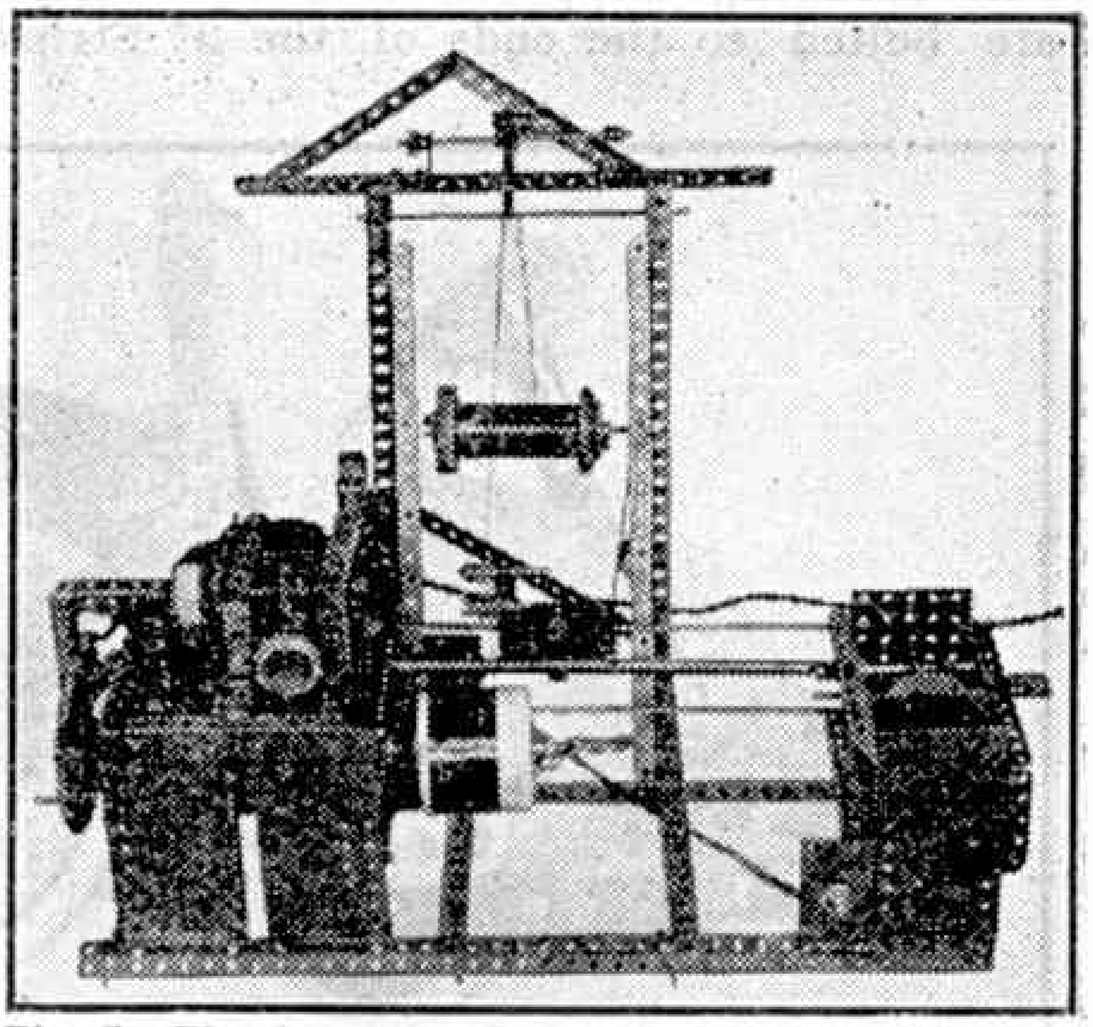


Fig. 5. The fine coil winder described on this page. It is in practical use at a radio repair depot.

New Meccano Models

Invalid Chair—Motor Chassis

OUR two new models this month are both of the mechanical type. One of them is a mechanically propelled invalid chair and is shown in Figs. 1 and 2. and the other is a simple motor chassis, which is shown in Figs. 3 and 4.

The model invalid chair is begun at the footboard, which is a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. A Flat Trunnion is bolted to one side of the Plate and is used to support the steering column. The sides of the Plate are bolted to 3" Strips overlapped two holes; the bolt used for the second hole also supports one side of the Double Bent Strip, making a pivot for the actuating levers.

The front plate is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ bent Flexible Plate attached to the Flat Trunnion by an Angle Bracket. The ends of the Flexible Plate are bent slightly as shown. The nose of the Trunnion carries a $5\frac{1}{2}''$ Axle Rod 2, which is fitted with a large Fork Piece that carries two $2\frac{1}{2}''$ Curved Strips to form the front forks. The Rod 2 is supported at the upper edge of the Flexible Plate by a Handrail Support 3 so that it swivels freely.

The steering handle is made up from a Bush Wheel carrying a $2\frac{1}{2}''$ Axle Rod in two Handrail Supports. Two $5\frac{1}{2}''$ Strips are bolted to the ends of the 3" Strips attached to the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the footboard. The third holes from the lower ends of these $5\frac{1}{2}''$ Strips form the journals for the $5\frac{1}{2}''$ Axle Rod, which is fitted with two 3" Pulley Wheels. The other ends of the $5\frac{1}{2}''$ Strips

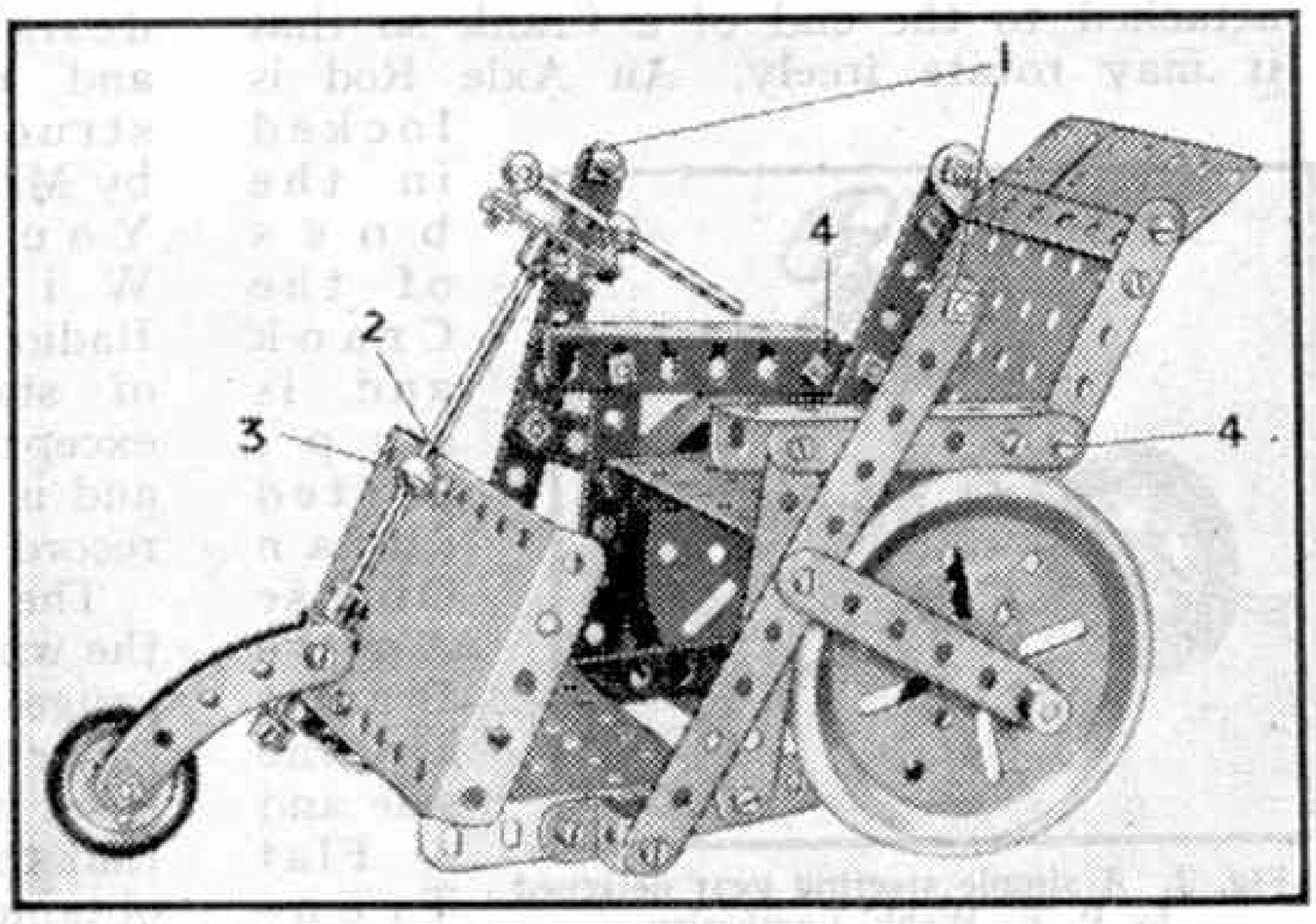


Fig. 1. A mechanically propelled invalid chair.

are bolted to a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate supporting two overlapping $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates. Below these is a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the back of the tricycle. To each side of the Flanged Plate 3" Strips 4 are attached, and these carry 3" Angle Girders that form the arms.

The upright supports for the seat are $3\frac{1}{2}''$ Strips bolted at one end to the 3" Strips that form part of the arms, and at the other end to the 3" Strips on the footboard. The actuating levers are made from $5\frac{1}{2}''$ Strips lock-nutted at their middle holes to 3" Strips, which are held by Collars on Threaded Pins fixed in the Pulley Wheels. The other ends of the actuating levers are pivotally connected to the Double Bent Strips at the sides of the footboard. Threaded Pins are attached to the top of the levers to form handles.

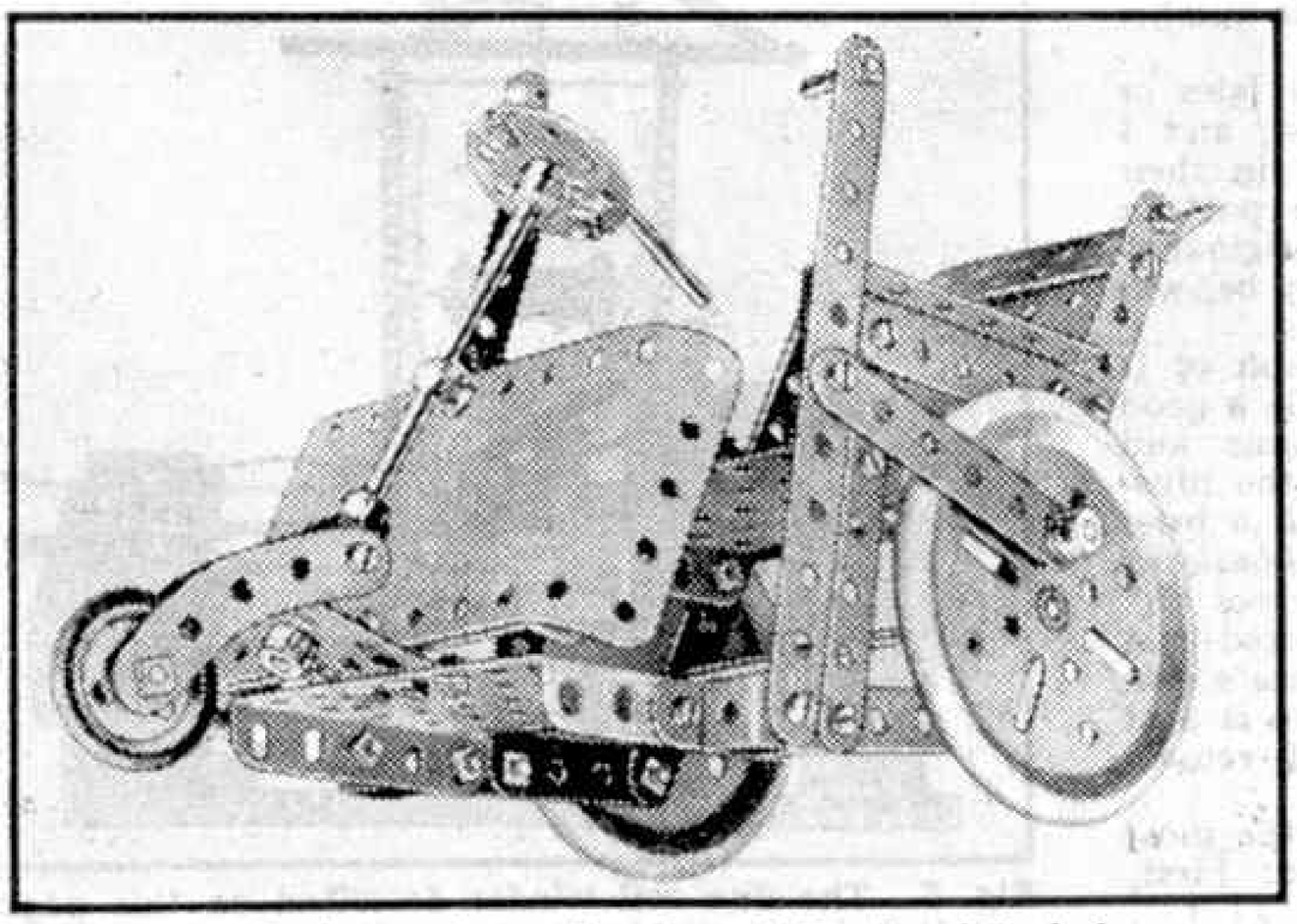


Fig. 2. An underneath view of the invalid chair.

Parts required for model Invalid Tricycle: 4 of No. 2; 2 of No. 3; 6 of No. 4; 2 of No. 9c; 1 of No. 12; 2 of No. 15; 1 of No. 16a; 2 of No. 19b; 1 of No. 24; 34 of No. 37; 6 of No. 37ap; 2 of No. 48b; 3 of No. 53; 3 of No. 59; 2 of No. 90; 4 of No. 115; 1 of No. 116; 3 of No. 136; 2 of No. 188; 2 of No. 192.

In constructing the motor

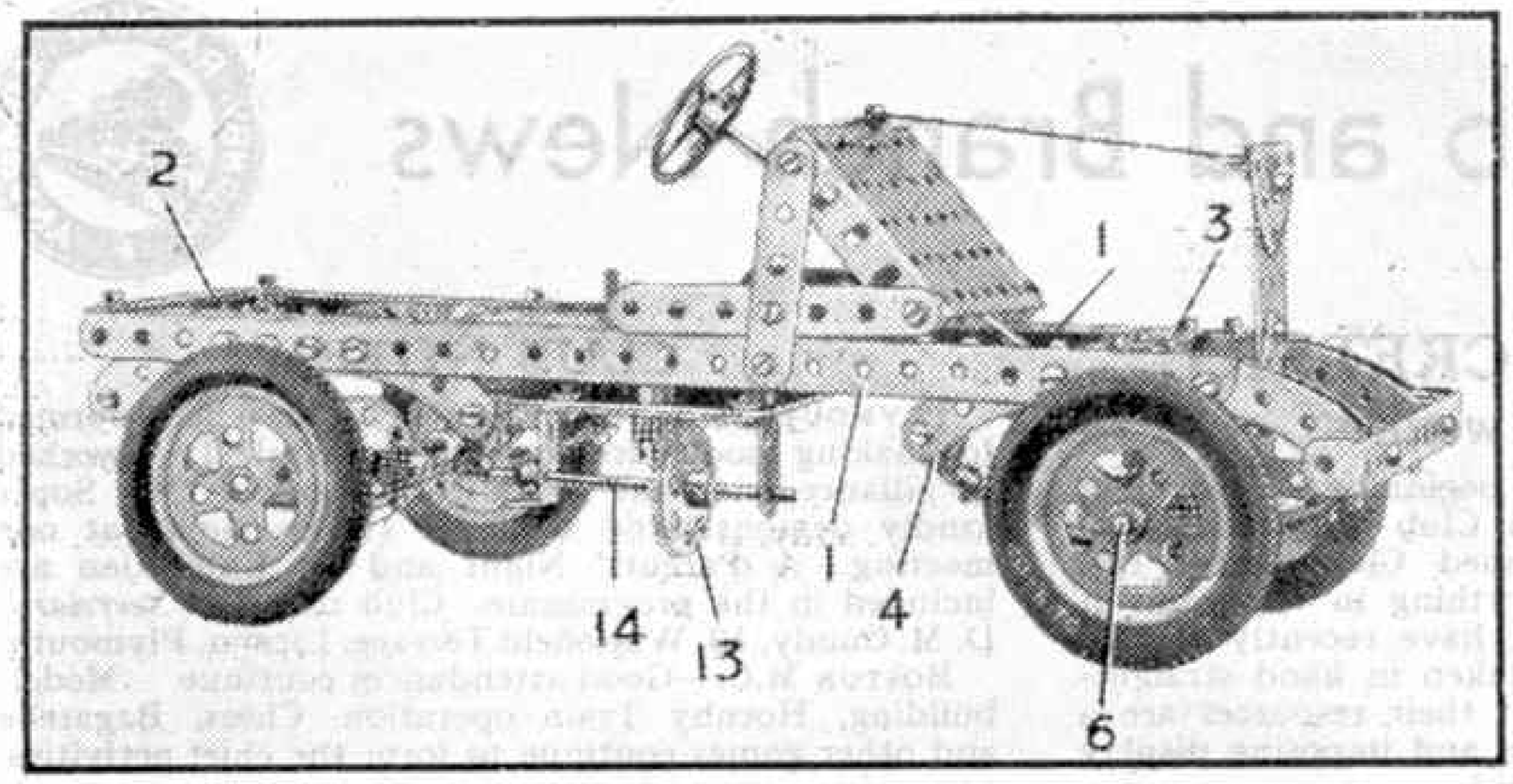


Fig. 3. A simple motor chassis driven by a Meccano No. 1 Clockwork Motor.

chassis, it is best to start with the side members, which are two 12½″ Angle Girders, spaced at their rear ends by a compound girder consisting of two 3″ Angle Girders. The side members are then connected by a 3½″ Strip 3. The front of the chassis is extended on each side by two 2½″ Curved Strips, which overlap three holes. The front ends of the Curved Strips are spaced by Double Angle Brackets supporting a 5½″ × ½″ Double Angle Strip that represents a bumper, and also an obtuse Angle Bracket that holds one end of the front springs. At the other end the springs are attached by a Corner Angle Bracket 4 to the 2½″ Curved Strips, which are bolted to the side members and overlap two holes.

Each of the four springs on the chassis consists of 4½″, 3½″ and 2½″ Strips. The front stub axles are attached to the springs by Handrail Couplings 5 (Fig. 4), pivoted by a ⅜″ Bolt that is spaced with three Washers and locks the two 1″ Axle Rods 6 in position. These Rods carry another Handrail Coupling 7, which is connected to a small Fork Piece 8.

A 2″ Axle Rod forms the tracking bar 9 that links the two front wheels, and is held in the bosses of the Fork Pieces. The right-hand Fork Piece carries a ¼″ Bolt 10, which passes through the slot in a Crank and holds one end of the tracking rod. The boss of the Crank holds a 6½″ Axle Rod used as a steering column. A 1½″ × ½″ Angle Bracket also supports the column and is attached to the 3½″ Strip spacing the side girders. A 3½″ × 2½″ Flanged Plate represents the front of the cab and is attached to the Angle Girders by the 2½″ and 3½″ Strips as shown in Fig. 3. A Trunnion is attached to the top of the Flanged Plate and provides support for the top of the steering column.

The rear springs are supported at each end by Corner Angle Brackets attached to the chassis by 2½″ Curved Strips that overlap the Angle Girders two holes. A 6½″ Axle Rod is used for the rear axle.

The No. 1 Meccano Clockwork Motor is bolted to the left-hand side of the chassis and the right-hand side is joined by a Fishplate. A 1½″ diam. Contrate Wheel 12 takes the drive to the rear axle, and engages a ½″ diam. Pinion that transmits the motion from a 5½″ Rod 14.

The drive is taken from the Motor by a ½″ diam. Pinion, which meshes with a 1½″ diam. Contrate Wheel 13 on the driving shaft.

Parts required for model Motor Chassis: 2 of No. 8; 5 of No. 9a; 7 of No. 9b; 2 of No. 9c; 6 of No. 9d; 1 of No. 10; 2 of No. 11; 5 of No. 12; 2 of No. 12a; 2 of No. 12b; 4 of No. 12c; 2 of No. 14; 1 of No. 15; 2 of No. 17; 1 of No. 18b; 4 of No. 20a; 2 of No. 26; 2 of No. 28; 85 of No. 37; 4 of No. 37bf; 40 of No. 38; 1 of No. 48d; 1 of No. 51; 1 of No. 53; 8 of No. 59; 1 of No. 62; 1 of No. 63; 10 of No. 90; 1 of No. 111c; 2 of No. 116a; 1 of No. 124; 1 of No. 126; 2 of No. 133; 4 of No. 136; 4 of No. 142a; 2 of No. 154a; 2 of No. 154b; 1 of No. 185; 1 No. 1 Clockwork Motor.

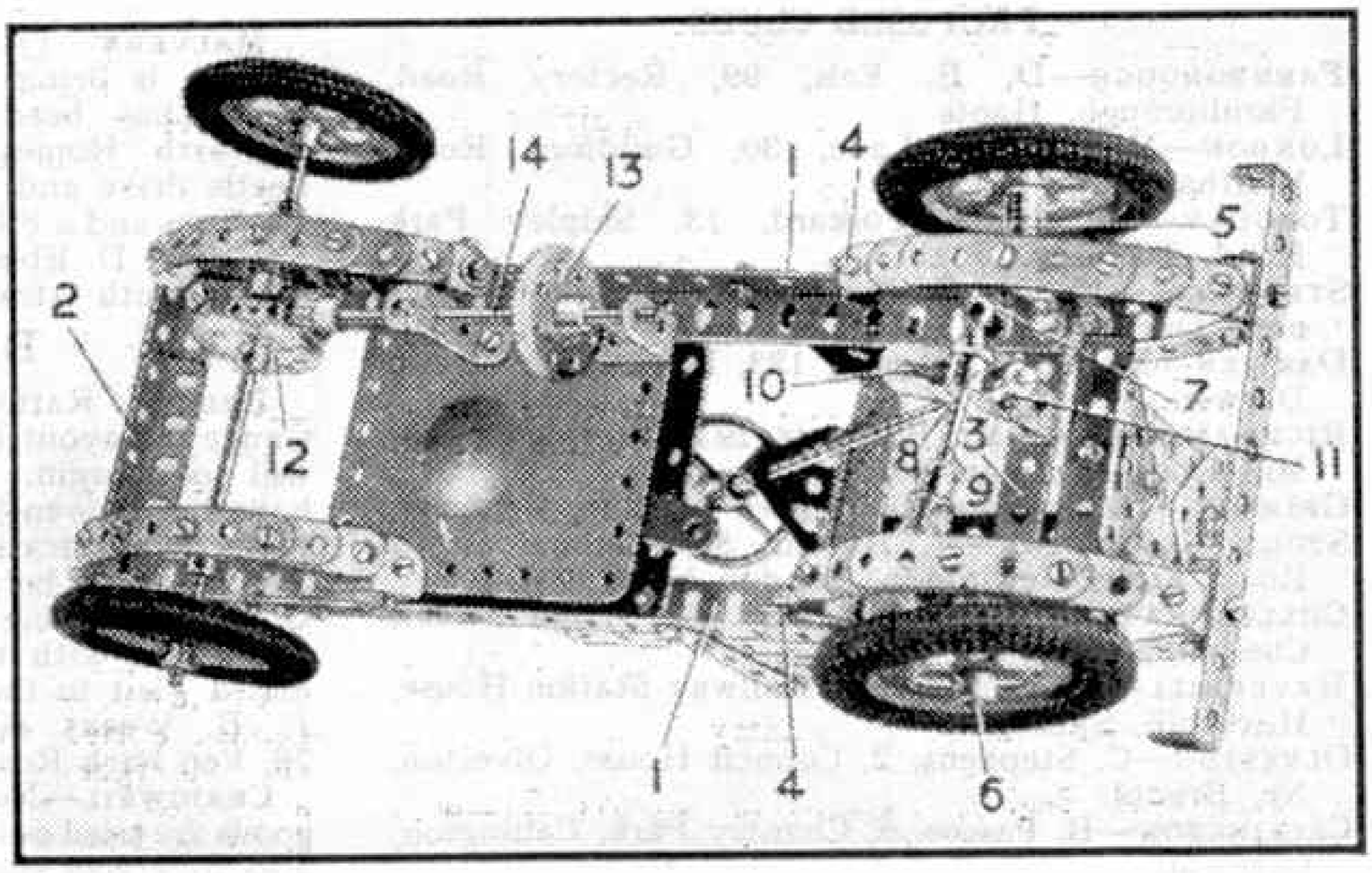


Fig. 4. The motor chassis seen from below.

Club and Branch News

WITH THE SECRETARY

A DISPLAY OF WORK—

The end of the month or the beginning of December provide the best times for a Club or Branch Exhibition. Officials of established Clubs know this well, and no doubt have everything in train, but in new Clubs, and in those that have recently started up again, matters should be taken in hand straight-away. It may be that as yet their resources are a little meagre, and that a large and imposing display is impossible, but they should not be discouraged by this. Enterprise and courage in planning something to show what good times members enjoy will bring its reward in recruits and in the interest of grown-up people who can be very useful. So where this has not been done, preparations for a display of some kind just before or during the Christmas season should be begun now.

—AND FUN AND GAMES

Another Christmas event that Officials must keep in mind is a Social. It does everyone good to spend a happy time playing games in a room decorated at least sufficiently to testify to the gaiety of the occasion. Refreshments of course must be provided!

Such a social could be kept for members only, but where there is plenty of room there is no reason why they should not be encouraged to bring friends, especially those who have shown some interest in the Club and are possible recruits of value. Fun and games go a long way towards making a Club, and occasional meetings of this kind provide an admirable change from more serious and strenuous efforts.

PROPOSED CLUBS

FARNBOROUGH—D. B. Eels, 99, Rectory Road, Farnborough, Hants.
LONDON—Mr. E. F. Lane, 30, Guildford Road, Walthamstow, E.17.
TORQUAY—Mr. Leslie Folkard, 13, Shipley Park Road, Torquay.
STROMNESS—Mr. D. S. Porteous, Hopedale, Stromness, Orkney.
DARWEN—Mr. G. W. Morris, 133, Duckworth Street, Darwen.
RICKMANSWORTH—Mr. B. Davis, 291, Uxbridge Road, Mill End, Rickmansworth.
GRIMSBY—D. McLean, 10, Princes Avenue, Grimsby.
STOKE NEWINGTON—F. Harold, 35, Bethnal Green Road, Stoke Newington, London N.16.
CHELTENHAM—D. Vanderplank, 381, High Street, Cheltenham.
HAVERHILL—H. W. Herbert, Railway Station House, Haverhill, Suffolk.
OLVESTON—C. Stephens, 2, Council House, Olveston, Nr. Bristol.
CALLINGTON—B. Pascoe, 5, Chantry Park, Callington, Cornwall.
ROMILEY—M. Begley, "Fairhaven," Greave, Romiley, Ches.

CLUB NOTES

PLYMOUTH M.C.—A new section has been formed for making models from plastic material. It is worked in alliance with the Woodwork Section. Mr. Soper kindly demonstrated a model steam engine at one meeting. A Parents' Night and an Exhibition are included in the programme. Club roll: 42. *Secretary:* D. M. Cundy, 10, Whitefield Terrace, Lipson, Plymouth.

BOSTON M.C.—Good attendances continue. Model-building, Hornby Train operation, Chess, Bagatelle and other games continue to form the chief activities.

Members of the Maastricht (Holland) M.C., Leader Mr. F. L. Bingen, enjoying camp life in the woods of South Limburg. This camping holiday extended over a week. The Club was affiliated with the Guild in 1933 under Mr. Bingen's leadership and its career has only been interrupted during the war years.

A Model Aeroplane Section also has been formed, the members of which fly rubber motored models and gliders. Club roll: 12. *Secretary:* P. E. Luff, 103, Woodville Road, Boston, Lincs.

SOUTH AFRICA

MALVERN (JOHANNESBURG) M.C.—The Junior Section is being built up steadily. A special Mixed Night has been arranged in preparation for the Epworth Homes Christmas Party, with stalls, a beetle drive and a dance. At an Open Night special Lectures and a Film Show were provided. Club roll: 23. *Secretary:* D. Eblen, P.O. Box 8, Cleveland, Johannesburg, South Africa.

BRANCH NEWS

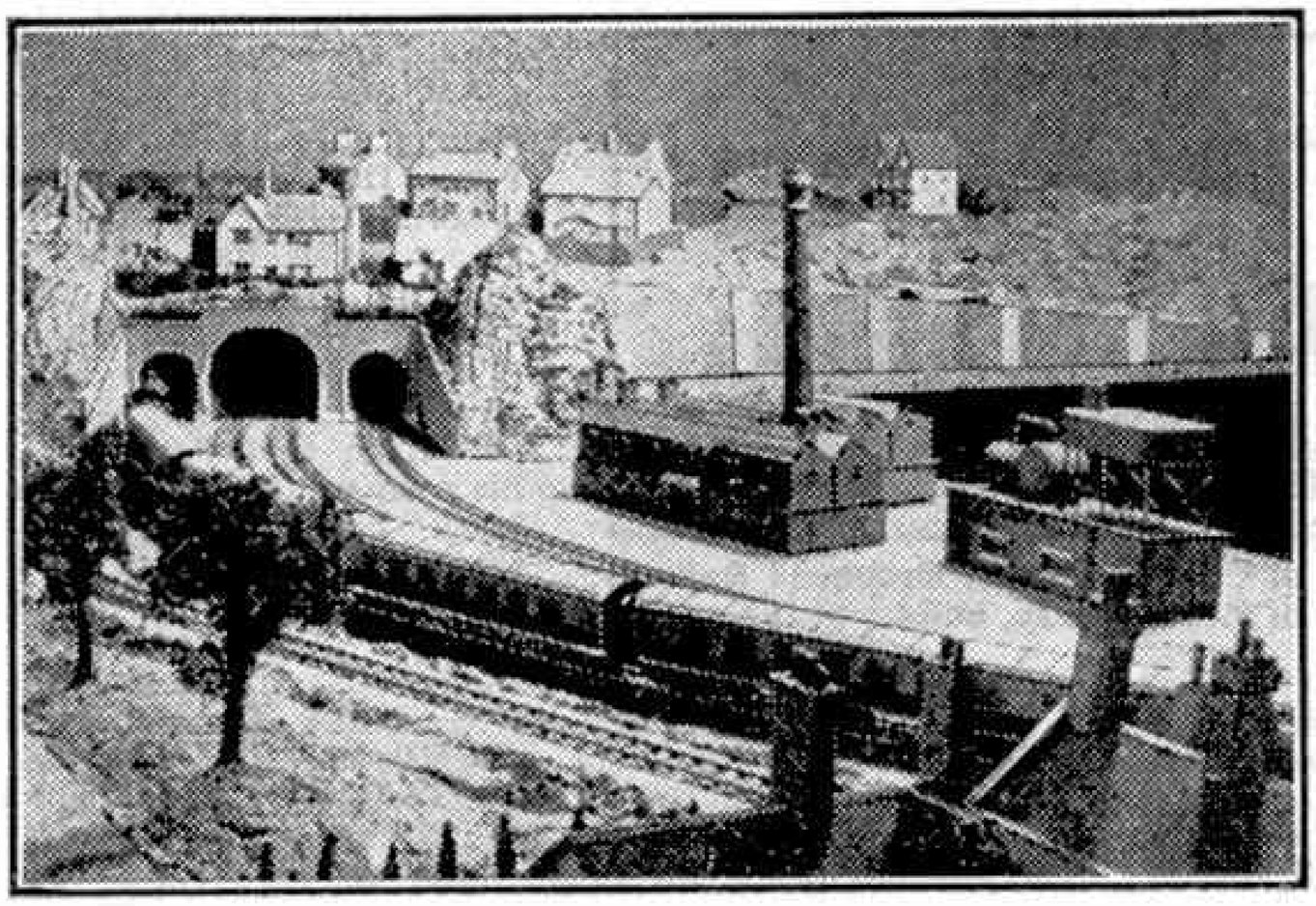
BRISTOL RAILWAY CIRCLE (JUNIOR SECTION)—A Gauge 0 Layout is under construction, and operations will soon begin. Talks on construction and running have been given by Mr. J. T. Fraser, Track Steward, with demonstrations. Practical tests are given to all members before they take part in operations. Other events have included a Talk on transport in India and with the B.A.O.R., by Mr. G. H. Soole, and a Visit to the Gauge 0 Garden Railway of Mr. F. B. Weeks at Cheddar. *Secretary:* R. F. Bigg, 76, Pen Park Road, Southmead, Bristol.

CRAIGWEIL—New train services for passengers and goods are tried out regularly on the Branch track, which also undergoes steady improvement. Cycle Runs also are enjoyed. *Secretary:* J. S. Evans, Two Orchard, Aldwick Bay, Bognor Regis, Sussex.

Kenview Model Railway in its New Home

By H. F. Howson

MOST readers will have heard of the Kenview Model Railway. This fine miniature railway came into existence in 1929 and was first opened to the public in November 1932 at East Finchley.



A scene on the Kenview Model Railway showing the main tunnels with scenic features above, and part of a new roadway.

Since that time more than 350,000 people have seen it and it has been filmed three times. A small charge is made for admission, and the proceeds go mainly to the Hornsey Central Hospital and the Railway Benevolent Fund. Every reader of the "*M.M.*" who is able to do so should pay it a visit in its new quarters at 27, Broadway Parade, Crouch End, London N.8.

The track of the Kenview Railway, of which there is some 750 ft., is arranged in an elongated oval and raised about 4 ft. above the floor. The gauge is 00, and is all electric, 12 volts being supplied through two banks of six accumulators each, charged from the mains circuit.

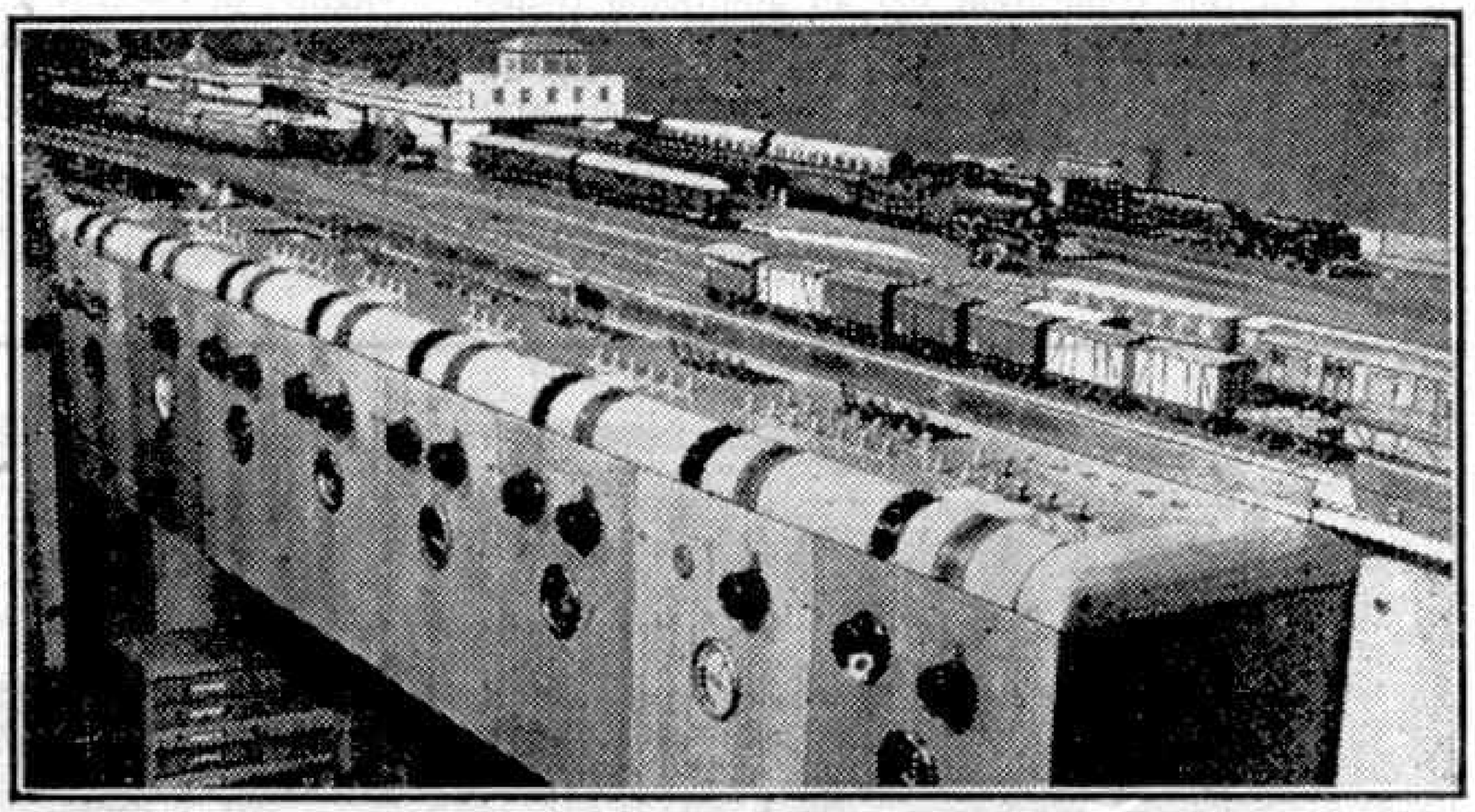
There are five tracks—two main line, two suburban and one Underground. A large and elaborate control panel faces the maze of points where stock can be moved from the sidings on to and across every line to the outer Underground track. Clever colour-light systems work with the electrically-operated points, so that when a points lever is thrown a green light indicates that the selectors are working, and a buzzer warning also sounds. A red light indicates the points motors operating, and when the lever is fully thrown and the points are home, both lights go out. It is intended to instal colour-light signalling at a later date, which will mean insulating one running rail from the other. Also in the control panel is a system of resistances which operate if too much traffic is moving on certain sections of the track, thus obviating overloading. Rheostat control enables the operators to regulate the speed of trains.

The layout is arranged to provide for alternative routing and direction, and when a good service is running, fast trains can move in each direction simultaneously, in addition to suburban trains. On the outer line is the Underground, emerging from deep-level halfway round the oval, and passing through a rising tunnel to emerge and cross all lines by a beautifully built fly-over bridge before plunging into deep-level again. At a halfway point in deep-level is a replica Underground station, whose outer glass wall enables spectators to watch the arrival and departure of trains.

There are six engines in good order, meaning that for five years and more these have been kept running, entailing the almost complete rebuilding of some. One engine that ran at Finchley covered over 1,200 miles, and is still running, though not on this track. Among the engines are one 4–6–2 L.N.E.R. Pacific, one 4–4–0 Southern L.I. There are also an 8-coach Southern Victoria-to-Brighton electric train, two three-car Northern and District Line Underground trains, and one three-coach Southern suburban train. Most of it is Hornby-Dublo stock.

The railway proposes to extend its running system to include a small fleet of buses. Like the railway now in operation, these will be remotely controlled from a centre panel, and will be able to pull into the kerb or avoid a stationary vehicle.

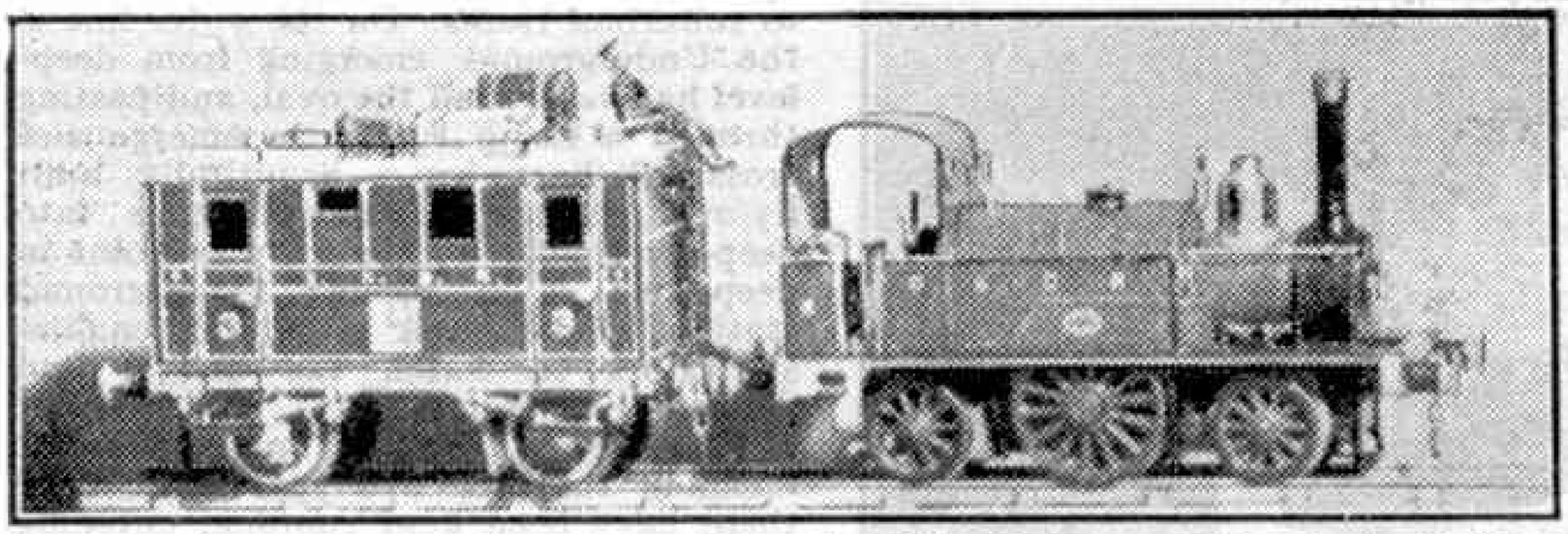
At the moment of writing, one prototype bus has been constructed and successfully tested, and is worth a brief description. It is electrically driven by an 00 motor through reducing gears. Current is picked up by collecting shoes from either a sunken (almost invisible) rail or a line of traffic-lane studs on the roadway surface. The front bus wheels turn freely on king-pins, while to a connecting bar a small inverted U-shaped piece of metal is fixed. This slides along the continuous sunken rail so that the front wheels are turned in whichever direction the guide rail runs.



A section of the main line with the control panel at the lineside. Points-operating levers and rheostat speed controls are shown.

A G.N.R. (Ireland) Exhibition Layout

WITH characteristic enterprise the Great Northern Railway (Ireland) recently made use of a miniature railway layout to illustrate some of its stock, equipment and typical services. This Gauge 0 layout formed part of the company's exhibit in the Industrial and Engineering section at the Royal Dublin Society's Horse Show at Dublin. The following details, reproduced by courtesy of the Great Northern Railway (Ireland), will no doubt be of interest to "*M.M.*" readers.



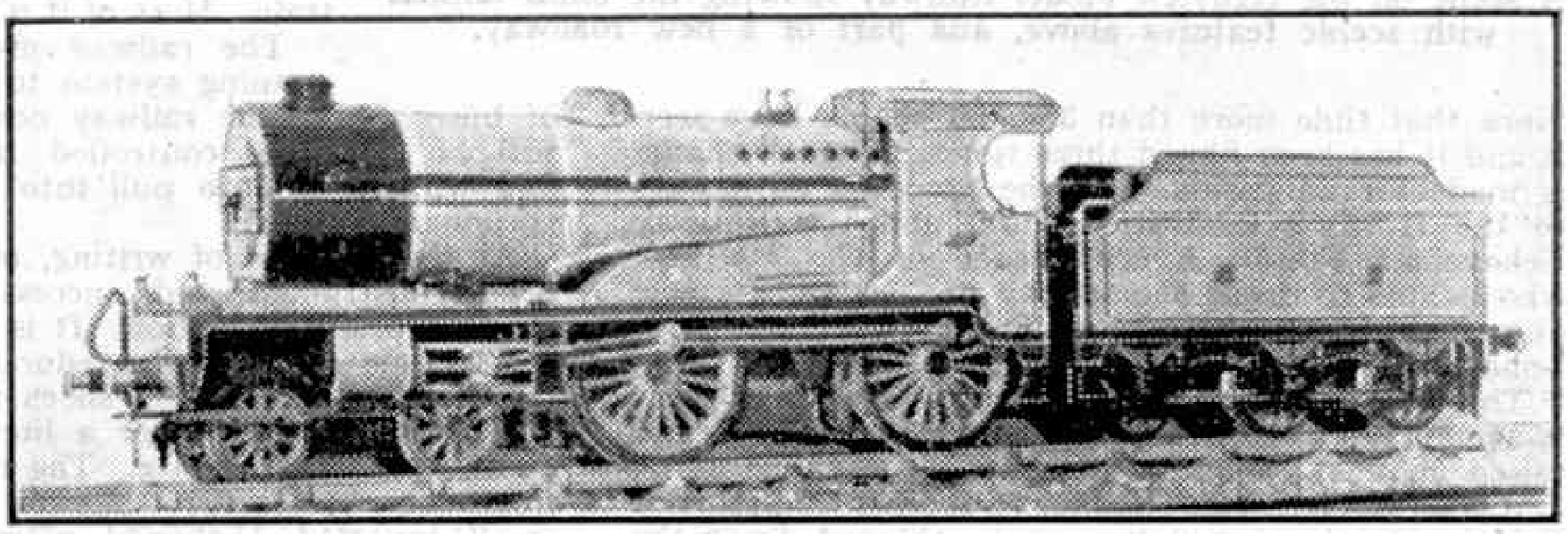
Models of a curious tank engine and coach of the Dublin and Drogheda Railway. The photographs on this page are by courtesy of Mr. C. L. Fry, builder of the models.

The layout, which was electrically operated, consisted of a double track main line laid with Hornby Steel Track and arranged as a continuous oval ballasted throughout. On one side of the layout was included a replica of the centre span of the Boyne Viaduct at Drogheda. Over this section single line working at reduced speed was introduced, as in actual practice, and a system of automatic control of signals and points was installed in order to prevent any collision between the up and the down trains. In this connection too an additional refinement was the reproduction of the warning "buzzer" that reminds drivers when they are approaching the real viaduct. On the model the distant signals were equipped with this device placed near the regulation "*Reduce Speed*" warning boards.

On the opposite side of the layout to the viaduct section a tunnel was provided by carrying the tracks through the space under the desk forming part of the stand structure. Actual scenery could scarcely be provided on a temporary railway of this character but the "real" atmosphere of the line was helped by the display on the inner side of the track of large landscape views showing places served by the G.N.R.

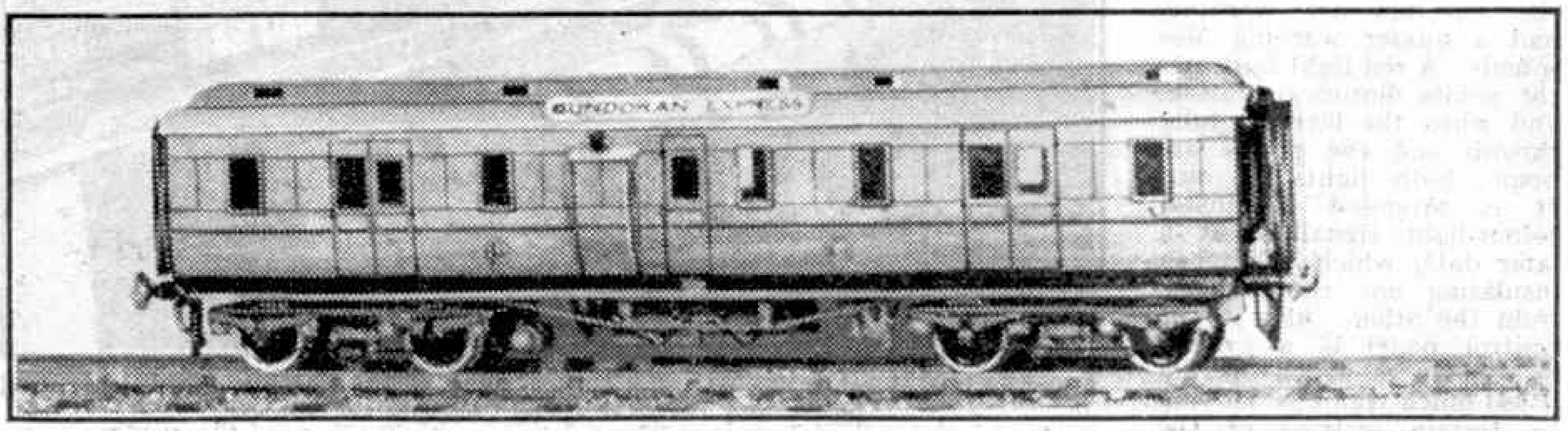
The trains that worked the traffic continuously during the five days of the Show were loaned for the purpose by Mr. C. L. Fry, Dundrum, a well known Irish model engineer, who has made a special study of the development of rail transport in Northern Ireland and in Eire. The stock shown in fact belongs to his own remarkable miniature railway system. Correct model rolling stock was assembled to form the G.N.R. "*Bundoran Express*," complete with nameboards, as shown on the typical clerestory-roofed brake van in the illustration at the foot of this page. Similarly a nine-coach "*Dublin-Belfast*" express train consisted of the latest corridor stock with kitchen and dining cars.

The engines used, resplendent in the bright blue livery that normally distinguishes the principal express engines of the G.N.R., were respectively models of the large 4-4-0 compound No. 83 "*Eagle*" and of the 4-4-0 No. 170 "*Errigal*."



G.N.R. (Ireland) 4-4-0 No. 83 "Eagle" in model form. The engine is complete in detail, even down to sand pipes and brake gear.

Various other models, both ancient and modern, were shown as stationary exhibits. Two of these are the diminutive 2-2-2 of the Dublin and Drogheda Railway of 1862 and a contemporary passenger vehicle. These appear in our top illustration.



A typical clerestory-roofed brake van of the G.N.R. (Ireland). Note the name board, tail lamp and other details.

Tank Engines on Hornby Layouts

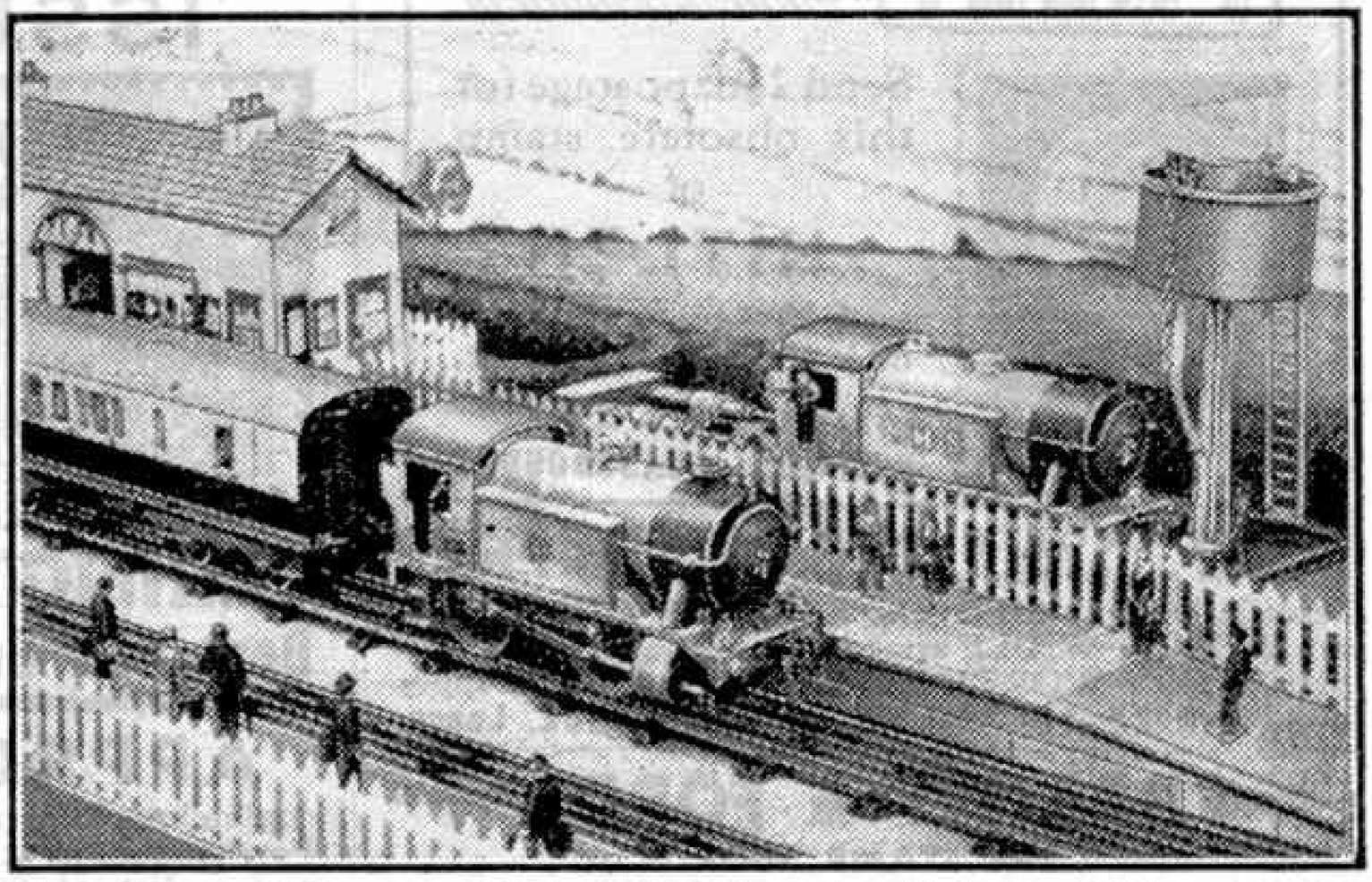
HORNBY Tank Locomotives have always been popular with model railway operators. Tank engines have many advantages in actual practice, and they are particularly useful in miniature. They do not take up so much space as tender engines, so that they fit in well with the restricted sidings and platform lengths that the model railway engineer is so often forced to adopt. Another point in their favour is that they can run equally well in either direction, so that the layout can be simplified on this account. For purely local working the smaller 4-wheeled tanks such as the M3 and the No. 1 types are ideal. They will handle quite a respectable load, and when they are set to haul a passenger train made up of Hornby No. 1 Coaches the appearance of the complete train is quite pleasing and realistic.

With this type of stock we can reproduce the characteristics of the more or less intensive working that is found in the "inner suburban" areas of most large cities. In such working it is usual, especially in miniature, not to run the engine round its train on arrival, but to make use of another engine for the return journey. This fresh engine can stand in an engine siding until the train arrives in charge of the first engine. We are all familiar with the sight of several tank engines waiting outside a big station for their next job. The waiting or "turnover" locomotive backs on to the other end of the train and is then ready for departure. A series of train and engine operations on these lines can be quite interesting, and with the working of signals and points that is necessary the whole scheme can take on much of the bustling atmosphere that is typical of real practice.

The No. 1 Special type of tank is still a four-wheeler, but is a bigger and more powerful engine than those so far referred to. An important distinction on electric systems is that the E120 Special Tank has automatic reversing mechanism, which makes it extremely useful for duties where there is much shunting or reversing to be done. For passenger working rather more important duties can be entrusted to the No. 1 Special Tank. Outer suburban trains making a few stops only on either their up or down journeys can be made up of bogie stock such as the Hornby No. 2 coaches, and their appearance will be in keeping with the relatively massive looks of the engine.

When working through coaches, tank engines sometimes carry "express" headlamps. This is the situation illustrated.

The bigger tank engines of full size railways are represented by the Hornby 4–4–2 No. 2 Special Tank and the corresponding electric models. These capable engines are ideal for heavy duties, and can deal very well with passenger or freight traffic on a miniature system. Longer distance outer suburban or even main line stopping turns of considerable length can be handled as in actual practice. On certain lines even, such as the Tilbury section of the L.M.S., tanks deal with virtually express services, and this type of work is very fascinating to follow up in miniature. Special and unusual duties sometimes fall to the lot of tank engines such as the Pullman and other "Race Specials" operated by the S.R. We can make our Hornby Tanks do similar work in miniature and an occasional Hornby "Pullman Special" headed by a No. 2 Special Tank looks very realistic.



A through coach from a miniature G.W.R. express being hauled by a Hornby E120 Special Tank Locomotive.

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For other Stamp Advertisements see also pages 476 and vii.

Stamp Collecting

First Steps in a Great Hobby

By F. Riley, B.Sc.

MANY of us have turned to stamp collecting to satisfy the collecting instinct that all real boys seem to possess. Others have been guided to it by kindly parents, relatives or friends who have hit upon the bright idea of giving stamps for a birthday gift or Christmas present. Before the war an album in which to mount the stamps very often accompanied such a present, together with a packet of stamp hinges. We have not yet returned to the lavishness of those days, but the position is certainly improving as far as albums are concerned.

Whatever form the actual start may have taken, the hobby is one that becomes more and more absorbing as the fun of hunting for more stamps grows. One way of adding to a collection is to get stamps from friends or relatives who work in offices where correspondence from overseas is received regularly, but these sources will not take the collector very far, and he then must turn to the dealers. Most of these prepare packets of say 250, 500 or 1,000 stamps, and newcomers to stamp collecting are usually advised to begin with one of these. The cost of a packet is considerably less than would have to be paid for the stamps themselves if bought separately, and another point to bear in mind is that a packet containing say 1,000 stamps necessarily costs more than twice as much as one containing say 500 stamps, for the simple reason that the larger packet must contain a proportion of the rarer and more highly priced stamps.

The beginner will have a very enjoyable time examining the stamps in his packet one by one and arranging them. Soon he will realise that there are gaps in his collection that cannot be filled by buying another packet, for the chance of finding in it the stamps that are wanted is necessarily very small. To meet the collector's requirements at this stage dealers offer sets of various kinds, advertising them in stamp periodicals and in magazines that give attention to the stamp collecting hobby. As an example of the use to be made of these sets, it may be found by one collector that some particular country is poorly represented in his collection. He then finds that certain dealers offer what are called long sets of that country, and fills up the blanks by purchasing one of these. It may be that such a set contains a few of the stamps already in the collection. It is almost certainly the lower priced stamps that will be duplicated in this way, however, and as sets cost less than the stamps themselves when bought separately there is no real loss. The duplicates can be kept for "swopping."

While building up a general collection in this way the stamp enthusiast learns the ropes of his hobby, but he is almost certain to take increasing interest in the stamps of certain countries or in those illustrating some particular subject, and he will begin to specialise in these. He may even have ideas of this kind from the outset, and this is not a bad thing, for it is as well to know where one is going at the beginning of a journey.

This brings me to an alternative to the packet method of starting to collect stamps. This is to decide on what is wanted, perhaps after a talk with an experienced collector, and then to keep a lookout for sets that will meet requirements. For instance, it may be that the interest of a collector is aroused by British Empire issues. This is a very wide field, with a wealth of attractive stamps in it, and a collector who confines himself to it will find that he can build up a very fine collection that is more than likely to increase steadily in value. I do not wish to stress the money side of stamp collecting; it is the pleasure and interest of the hobby that should guide the collector, but it is very consoling to know that the value of what is being collected is being maintained and is perhaps increasing. Romantic stories of discoveries of rare stamps bringing in fortunes are all very interesting, but examples are rare, and the general collector is not likely to acquire a fortune, or even a respectably large sum of money, in that way.

It will probably be found that, even with the aid of the sets that dealers advertise, a collector will still have gaps in certain portions of his collection, and he must then try another service provided by dealers. They are usually prepared to send out approval books, in which are selected stamps, each marked with its price, so that their clients can take out any they choose. Those who take advantage of this method should tell their dealers which stamps they are interested in, giving him the names of countries or the subjects of design, to avoid the sending of approval books containing stamps that are of no use to the applicant. Those who receive approvals from dealers should be careful to look through the books immediately and to return them, with a postal order to cover the cost of any stamps removed, at the earliest possible moment. The remaining stamps must not be moved from their positions.

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F. Harlow (B.P.A.), 133, Bradbourne Vale, Sevenoaks, Kent

For other Stamp Advertisements see also pages 474 and vii.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

OUR first illustration this month shows one of the new Hong Kong "Victory" stamps. One can just imagine what a rush there would have been for these had they been issued alone, and not as one of a large number of "Victory" issues. As it is, they will probably be quite popular, for they are striking enough and have received a good deal of publicity in the national newspapers.

Regarding the design, the story goes that a man who was interned in Hong Kong during the occupation made the drawing and showed it to someone connected with the Hong Kong post office. The two were able to bring it before the authorities later on, with the result that two rather striking stamps were issued; at any rate they are a change from the general Crown Colony design.

By the time these words appear in print the new set for Canada will have appeared. Several collectors have asked if this set can be considered as part of the "Victory" series. The answer is that while a collector can consider it as such if he so pleases, actually the stamps are merely an adaptation of the war publicity set and they will probably remain in use for a long time. There is to be no change yet of the low values bearing the King's head; only the pictorials are being altered.

Incidentally two of the values have met with a good deal of criticism in Canada. One of the stamps shows tree cutters at work and, according to experts, if one of the men depicted on the stamp were actually to stand in the same position while a tree was being felled, he would be killed for certain. The ploughing scene on another stamp, illustrated here, also caused a bit of fuss. Many thought that the plough was going the wrong way round, but according to others, a special hill plough was being used and technically the ploughing was being carried out correctly. All this, by the way, was quite good publicity for the stamps.

We mentioned that this set probably would remain in use for a long time. This is quite as well, if all British collectors are to get a chance to secure a set, for now that barter in mint colonial stamps has been stopped it will be difficult for dealers over here to obtain supplies.

Last month we mentioned the latest U. S. A. commemorative, the stamp issued to mark the 100th anniversary of the Smithsonian Institute.

We are now illustrating it. In view of the fact that an Englishman donated the money for the founding of this famous institution, the stamp has a special interest for British collectors.

It is difficult to get away from "Victory" stamps, and we have heard of a nice little variety in the way of a first day cover, that should be looked out for as a scarce item. The first of the Crown Colony sets to appear was that for Fiji, and on 17th August a number of first day covers were posted at Suva, the capital. These were being cancelled, and after only a few minutes it was noticed that the date of the canceller was 17th September instead of 17th August. A correct date was at once applied to the covers. So a few bear both dates, and lucky indeed will be the collectors who get hold of these; quite unlike what such curiosities generally are, these certainly were not prepared by design.

As there is a chance of new Indian stamps in the near future, collectors are bestirring themselves to fill their blanks of current stamps, and the new provisional which we are illustrating is being snapped up. As a rule there are always plenty of Indian "provisionals," when they appear, to go round, and collectors should have no difficulty in getting what they want; however, the stamp which will cause a headache is the 1a. 3p., which has been surcharged, for we are informed officially that all were used up for the overprinting. Used will be common enough, but mint will be in very short supply. We are making this stamp our tip for the month, but take care—the stamp must be mint.

There is news from Australia that a new set of stamps is to be issued, and these should be ready for about the end of the year if all goes according to plan. An air-mail set also is projected. Actually Australian stamps, particularly mint, are exceedingly popular, so blanks of the current set should be filled now. They will never be as cheap again. There has been a much greater demand all round, but not many years ago one could hardly give mint Dominion stamps away, particularly the rather dull issues of Australia and South Africa. To-day they are fetching fancy prices, not only in their respective countries, but also in Great Britain, and there are some values worth several times catalogue.

We seem to have talked about nothing else but Commonwealth stamps this month, apart from the mention of the U.S.A. commemorative, but after all it is better to refer to stamps that collectors can get, and now that barter has all but ceased, dealers are going to find it very difficult to obtain foreign new-issues.

We had hoped this month to illustrate one of the Australian commemorative stamps that are being issued to commemorate the centenary of Mitchell the explorer, but these after all were not to come out until October so we shall have to wait until next month

From Our Readers

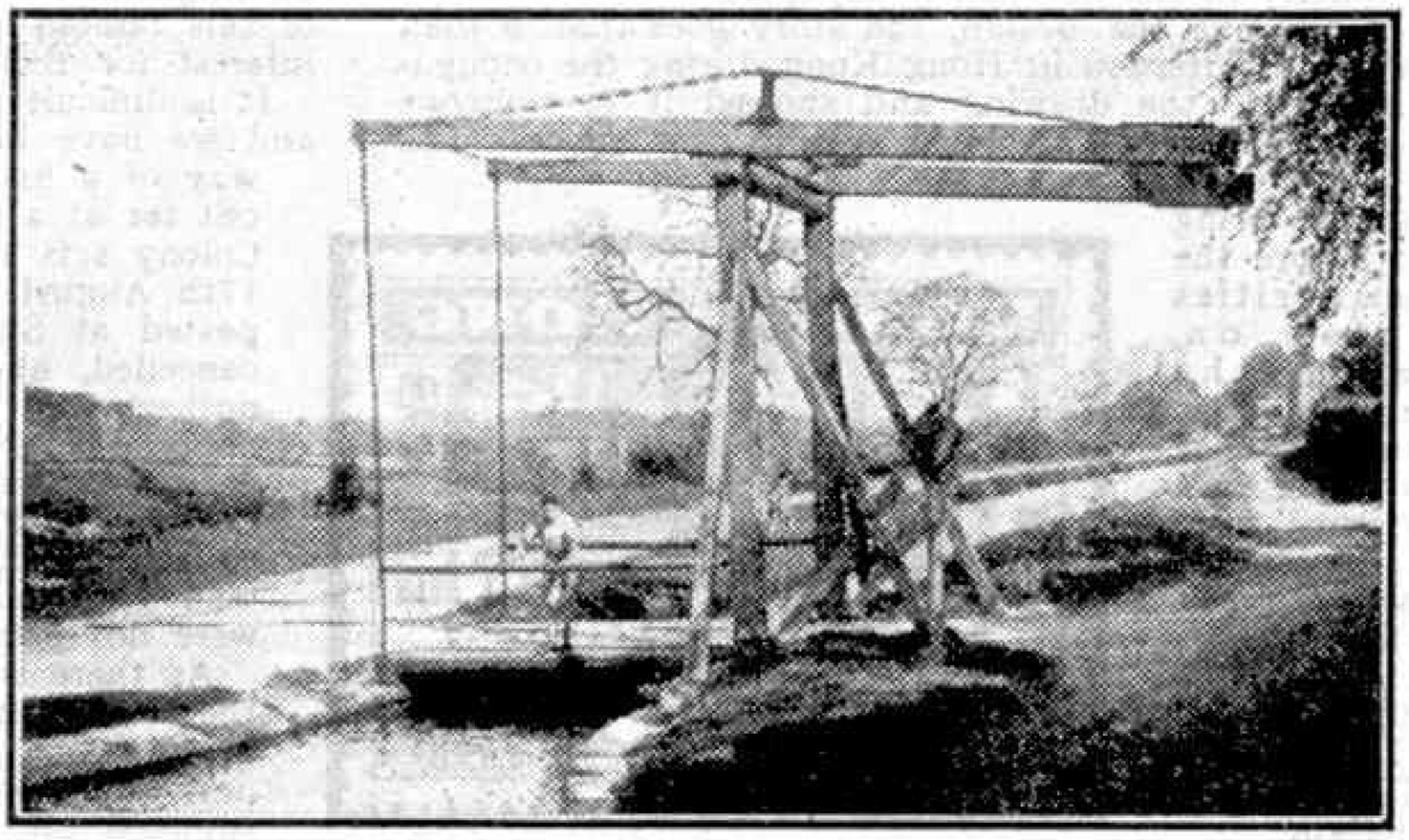
This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A WELSH BALANCE BRIDGE

At Fron Cysyllte, near Llangollen, there is a unique balance bridge crossing the Shropshire Union Canal, and a photograph of this is reproduced on this page. Like the shadoof, the water-raising contrivance used by the fellaheen, or peasants, of Egypt since time immemorial, the Fron Cysyllte canal bridge is worked on the counterpoise system, the weight on the right-hand side of the balance beam being just a fraction less than the weight of the bridge. When the bridge is to be lifted, it is only necessary to pull steadily on the rope attached to the beam weight.

It is worth mentioning that close to the balance bridge is the fine stone and iron aqueduct, constructed by Thomas Telford, that carries the waters of the Shropshire Union Canal over the broad vale of Llangollen. This was constructed when Telford was engineer of what was then the Ellesmere Canal. The lowest part of the valley of the Dee beneath the aqueduct is 127 ft. below the water level of the canal. The 19 arches of the structure extend over a length of 1,007 ft., and it was described by Sir Walter Scott as the most impressive work of art he had ever seen. Telford constructed also the Holyhead Road, which passes through Fron Cysyllte on its way to Llangollen, Corwen, and finally Holyhead. It was along this road that the horse-drawn "Holyhead-Mail" ran before railways existed.

CYRIL R. ROWSON (Liverpool).

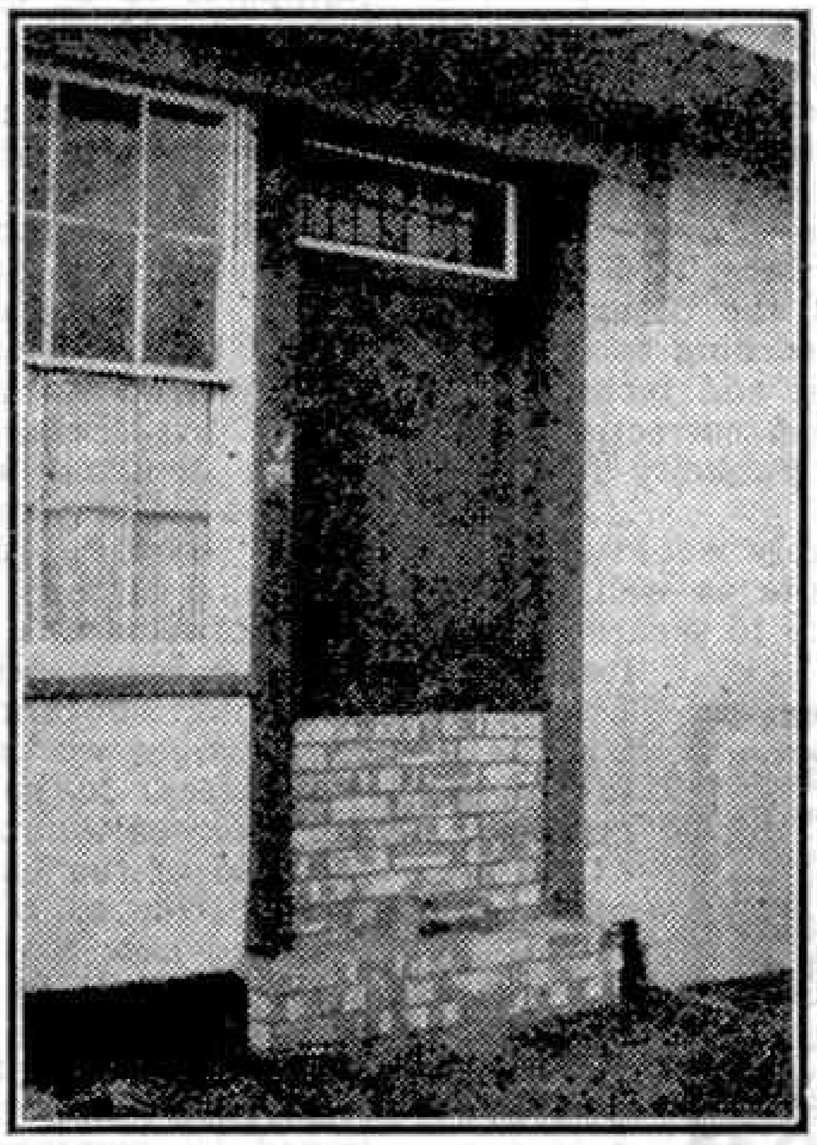


The balance bridge over the canal at Fron Cysyllte, near Llangollen. Photograph by C. R. Rowson, Liverpool.

FLOOD PRECAUTIONS

The floods that created havoc in large areas of the north of England in September are a reminder that the overflowing of rivers is not by any means rare in certain districts, and various ways of dealing with the menace have been worked out. An example of this comes from Strand-on-the-Green, on the River Thames, where precautions have to be taken against the flooding of riverside houses during the winter flood season, when the river so often overflows its banks. The lower illustration on this page shows one of the doorways, which has been bricked up to a "safe" level to prevent the water entering the house. In other cases steps have been constructed leading up to a doorway made on a floor level higher than the pathway, so that entry can be effected when the lower part of the door is under water.

H. W. DEAN (Purley).



A flood precaution at Strand-on-the-Green, on the Thames. Photograph by H. W. Dean, Purley.

LANCASTER CASTLE

Lancaster Castle, which I visited a short time ago, is one of the best-preserved in the country. It crowns a hill 120 ft. above the town and the River Lune. The first fortifications on this hill are thought to have been made by the Romans, but only a few traces of Roman work are noticeable, mainly in the base of Hadrian's Tower. The Saxons were the next to build on the hill, but it was the Normans who built the first of the now visibl seactions, in 1088. Some of the old Roman towers and walls were used in their construction.

The castle has been in almost continuous use since Norman times. In 1788 a large sum was spent in converting it into the County jail and Assize Courts. As it was the only jail in Lancashire for some time it gained rather a bad name, and Lancaster became known as the "Hanging Town." The most famous trial and execution in Lancaster probably was that of the Lancashire Witches, who in the reign of James I were proved guilty, mainly on the evidence of a nine-year-old girl.

The use of the castle as a prison ceased at the commencement of the 1914-18 war, when it became a P.O.W. camp. When the war ended the castle entered a new role, as a training depot for recruits to the Lancashire County Constabulary. In the last war it was occupied by the military, who besides using the old cells, even turned the one-time Royal apartments into living rooms and, I must say, certainly brightened things up.

W. G. EDWARDS (Liverpool 4).

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

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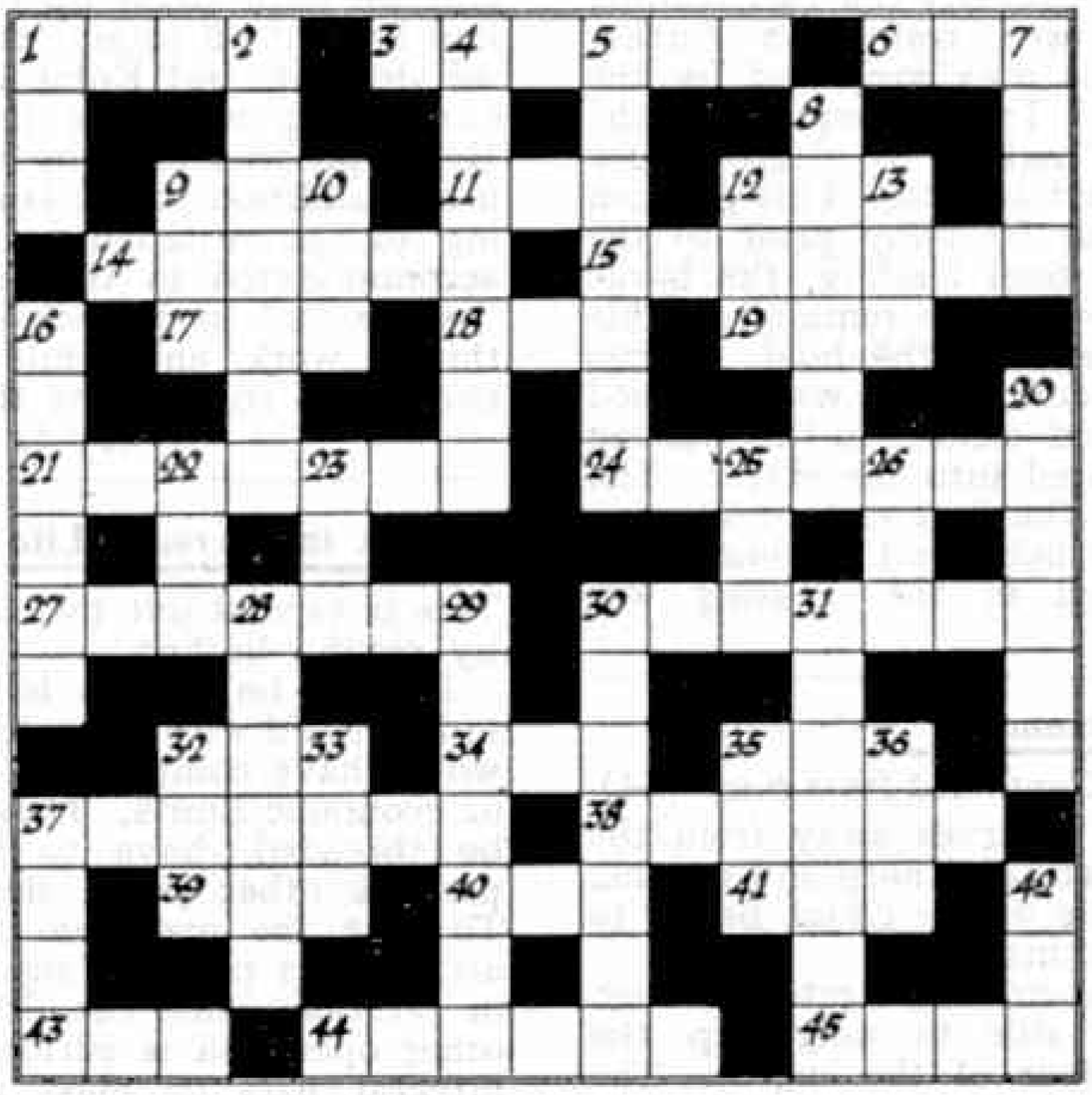

CLUES ACROSS

1. Possessed
3. Stellar
6. Fabulous bird
9. Girl's name
11. Wipe
12. Girl's name
14. Interruptions
15. Endure
17. Knack
18. Weary
19. Cereal
21. Alien
24. Last course
27. Hold back
30. Excessive
32. Part of head
34. Regret
35. Two-part song
37. Blame
38. Fissure
39. Russian river
40. Statute
41. Perish
43. Sailor
44. Have recourse
45. Recess

CLUES DOWN

1. Dried grass
2. Varied
4. Twisting
5. Reproved
7. Italian lake
8. Standards of perfection
9. Long period
10. Consume
12. Fuss
13. Craft
16. Yield or produce
20. Greek city
22. Rend
23. Solid water
25. Fix
26. Spin out
28. Motive
29. Flows
30. Voter
31. Joining again
32. Aim
33. Hasten
35. Parent
36. Single
37. Young horse
42. Shaggy animal

This month's crossword puzzle, submitted by our reader T. K. Chaplin, will be found to follow the lines of the previous ones we have set on this page. Every effort has been made to provide a fair and interesting puzzle, without any traps in the form of alternative solutions. Every word used can be found in Chambers' or any other standard dictionary.

As usual, there are two sections in the competition, for Home and Overseas readers respectively, and in each prizes of 21/–, 15/– and 10/6 will be awarded for the best solutions. If necessary the judges will take neatness and novelty into consideration. Entries should be addressed *"November Crossword, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 31st December; Overseas Section, 30th June, 1947. *Do not cut out the diagram on this page.* Make a copy of it for your entry.

What Engine Classes Are These?

Our second competition this month concerns engine classes of the four British railways. Short titles have been made up for 12 of these, giving such details as name, wheel arrangement and owning company, after which the titles have been broken up and the words in them re-arranged as follows:

Stanier; 5; Class; Clan; Pacific; Highland Railway; mixed; Class; Fifth; 2-cylinder; 4-4-0; 4-6-0; the; George; traffic; 4-6-0; Gresley; Green; 4-6-2; Central; 2-6-2; G.W.R.; D9; Royal; ex-Great; Arrow; 3-cylinder; Royal; 4-4-0; 6P; S.R.; West; Nelson; G.W.R.; Princess; Scot; 4-6-2; Country; Castle; Lord; 4-6-2; 4-6-0; 4-6-0; L.N.E.R.; 4-6-0; King; L.N.W.R.; L.M.S.; L.N.E.R.; S.R.

From this mix-up competitors are asked to pick out the details of the 12 classes concerned in the contest and to place these in order. This should be an interesting hunt.

When all the 12 classes have been discovered care should be taken that each word or phrase in the list has been used once. Then the result should be put in the form of a list and sent to *"November Engine Class Contest, Meccano Magazine, Binns Road, Liverpool 13."*

There will be two sections, for Home and Overseas readers respectively and in each there will be prizes of 21/–, 15/– and 10/6 for the best entries in order of merit, with consolation prizes for other deserving efforts. Ties will be decided on neatness and originality.

Closing dates: Home Section, 31st December; Overseas Section, 30th June, 1947.

November Photographic Contest

This month's photographic contest is the 11th of our 1946 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: *"November Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 30th November; Overseas, 31st May, 1947.

Submarine Power and Telephone Cables—

(*Continued from page 453*)

The test voltage applied was 16,000 volts between cores and to earth for 15 minutes.

For the laying operation, a 60-ton barge was selected and this was towed by a small diesel-engined tug. The cable was paid out direct from the drum which had been placed on jacks fitted into the barge hold. From the drum the cable passed through a fair lead guiding it to the brake gear, and then through another fair lead on to the stern rollers and so into the water. A direct course between the two landing points could not be followed owing to further development schemes in this area projected by the Cattewater commissioners. In consequence, the course of the cable had to make a 70 degrees turn about 200 yards from the first landing. This position was determined and marked by buoy prior to the laying. On arriving at the final landing, the barge was held off in deep water while the remaining cable was uncoiled from the drum into the hold, to free the bottom end. This completed, a rope was attached to the end, the cable hauled ashore to the jointing position and the bight lowered into the water. The time occupied from landing the first end to slipping the final bight was exactly 1 hour, and the maximum depth of water encountered in the crossing was 7½ fathoms.

Footplate Trip on the "Turbomotive"—

(*Continued from page 444*)

where the London "branch" curves away from the Manchester road, and negotiating a sharp and curving rise past the shed, the needle of the gauge began to move up towards the 250 lb. mark.

As we moved along the fast-running stretch through Liverpool's suburbs I was able to weigh up the running and general behaviour of the engine. The "Turbo" definitely rides well, and as we cruised along on two jets speed mounted to 63 m.p.h. at Speke sidings and 70 at Hale Troughs. Now Ditton Junction loomed ahead and the curving arched viaduct approach to Runcorn Bridge, the viaduct appearing to rise up right into the sky. As we climbed we rose above the roofs of the town of Widnes, and so round on to Runcorn Bridge, where the signal commanding the entrance to the bridge is planted in the middle of one of the ornamental towers forming the approach. From the footplate the sensation of dizzy height here is most marked, and as we swung across the rather depressing-looking Mersey and the Manchester Ship Canal I saw once more an old friend, the Transporter Bridge, a favourite subject for Meccano model builders.

The evening was by now closing in; looking westward beyond the haze above the water striking purple and gold sunset effects were seen to great advantage.

Off the bridge and through Runcorn station we entered on the rather difficult and somewhat dull stretch of road that seems to prevent much recovery of speed until the West Coast main line is joined at Weaver Junction. The three jets used from Ditton up to the bridge were reduced to two and so No. 6202 bore us along through the fading evening, while signal lights began to stand out more clearly as darkness fell. At Weaver Junction the up and down Liverpool lines temporarily part company. The up one passes over the West Coast main line and then descends to join it; the down has a plain turnout from the down West Coast line. The arrangement is thus a "flying junction" which avoids the crossing on the level of the down main and the up line from Liverpool and the possibility of delays that would be occasioned by a double junction of normal type.

Crossing the River Weaver by Dutton Viaduct we sailed through Acton Bridge, and then we were getting along nicely toward Hartford when there was a noticeable easing of the engine and a touch of the brakes. "*There's a slack at Hartford*" called out Fitter Broach to me, and sure enough there was evidence along the track of permanent way work having been in progress. The men had of course by then knocked off but the slack imposed still remained. There were in fact several slacks on the up road on that day and at each the speed restriction was carefully observed. So we sped across the Cheshire salt country, past Winsford and Minshull Vernon and, with the darkness now full, speed was reduced as we ran into Crewe with the brilliant colour light signals pointing the way into the station. With a sigh from the driver's brake valve we stopped alongside platform 4.

Driver Worman sat back, glanced at his watch, and wiped his hands on the inevitable hand cloth, and we both stood up to stretch our legs. Broach had hopped off to give the engine a look round while we stopped, and Robinson disappeared with a large enamel jug which he had produced from a locker. He reappeared as if by magic with the jug full of a useful addition to the stock in the tea bottles belonging to the occupants of the cab. These were all accommodated in the tender bucket to keep cool; "*on the ice*" as Broach expressed it. Footplating is thirsty work, and while tea, hot, is appreciated at stops, tea, cold, is the thing while on the run.

(To be continued)

Plastics in Everyday Life—(*Continued from page 456*)

This is carried out by hand, the marks being erased by careful buffing.

It may be that a batch of plastic parts require to be drilled with special size holes, which in moulding would have complicated the mould beyond practical or economic limits. These holes, some of which may be threaded, have to be drilled carefully, to fit perhaps other parts, depending on their accuracy. To ease the operation and make it as rapid and accurate as possible, jigs are made to hold the part in position while the drilling, cutting, threading or other operation is performed. Such a method is an integral part of mass production and contributes towards the cheapening of the saleable value of the product.

There are of course many other operations which may be performed with plastics, such as bonding, impregnation, coating, spraying, surface hardening, and so on.

In the next article we shall discuss many of the uses of plastics.

L.M.S. Clyde Steamers—(*Continued from page 464*)

on the East Coast and was damaged by a near miss during an air raid. Later she became a minelayer. The "*Queen Empress*," already referred to, also became part of the 12th Flotilla and has two enemy aircraft to her credit. Both vessels have been returned from war service and have now been sold for breaking up.

Although not in naval service the "*Queen Mary II*" had some unusual jobs during the war. At the outbreak of war she evacuated children from Glasgow and she brought ashore the first Canadian troops in December 1939.

Both the "*King Edward*" and the "*Queen Mary II*" are once again working on the Williamson-Buchanan "all the way" services from Glasgow to the Clyde coast resorts, but appear to be operated by the L.M.S. and are painted in the colours of the Caledonian Steam Packet Co.

A ROYAL CYCLIST

It is sometimes said that every person is born into the world wanting a bicycle! The cycle is the means of transport of the million, and one of the keenest cyclists in Britain is 12-year old King Faisal II of Iraq who, passionately fond of anything mechanical from cycles to aeroplanes, has done a great deal of exploring of the Berkshire countryside on his "Hercules" bicycle. The young monarch carefully studies his routes before commencing his trips and derives great pleasure from his rides.

Fireside Fun

"Stop eating off your knife, Willie. It's rude."
"I can't help it, mum. My fork leaks."

* * * *

"On one side was the lion, creeping up on me. On the other was the lioness approaching stealthily. I waited until they were about three yards away and. . . . ."
"And then you woke up."
"Not at all, sir. I . . . . ."
"Gee! I couldn't have slept on after that."

* * * *

"Hi miss! This tea you brought me tastes like cocoa."
"Sorry sir. I must have given you coffee."

* * * *

"Poor old Jones is workin' 'imself to death."
"How's that?"
"You see, 'e's so shortsighted, 'e can't see when the boss ain't lookin'."

* * * *

"I want a book for my nephew."
"Certainly, madam. Any particular subject?"
"Well, he's a porter on the railway, so I thought of buying him a copy of 'Hints on Successful Platform Speaking'."

* * * *

An editor can dig and hunt
For jokes until he's sore,
But some wise guy is bound to say
"I've heard that one before."

* * * *

"That's better. You aren't swallowin' so much—doing more to the gallon, so to speak."

BRAIN TEASERS

RAIL BEATS

An express travelling up to Euston was slowly overtaking a tube train on the neighbouring suburban track. A passenger in the express noticed that the rail beats of the two trains coincided at every sixth beat of the express wheels on the joints. If the tube was travelling at its maximum of 45 m.p.h. how much faster was the express travelling? T.K.C.

* * * *

MORE CODE WORK

In connection with a football pool the names of football teams were notified to those taking part by means of a number code. Thus one member received a card with the following numbers: 26, 9, 8, 22, 13, 26, 15. According to the code this meant ARSENAL. Another member received the following number message: 25, 18, 9, 14, 18, 13, 20, 19, 26, 14, What team did this represent?

* * * *

"Head it is. Which way will you play?"
"With the tide!"

* * * *

ONE MISSING LETTER

Here is what seems to be a jumble of letters without any meaning. One letter only is required to put sense into it, but this must be included 11 times.

LEEPLENEIADITREINGDIEAE

With the addition of this one letter in 11 places the mass resolves itself into five words. S.W.C.

* * * *

CLOCK FACE LORE

Can you draw two lines on a clock face so that it is divided into three sections in which the numbers add up to the same totals? S.W.C.

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The 10 words satisfying the clues in our first puzzle last month were as follows: Bambino; Friarly; Stalder; Marline; Giraffe; Blunter; Twitted; Playful; Quintic; Bedewer. The middle letters of these words taken in order give the name BALLANTYNE. R. M. Ballantyne was the author of *"The Coral Island"* and many other famous boys' stories.

The number of balls of each colour in our second problem is clearly one.

* * * *

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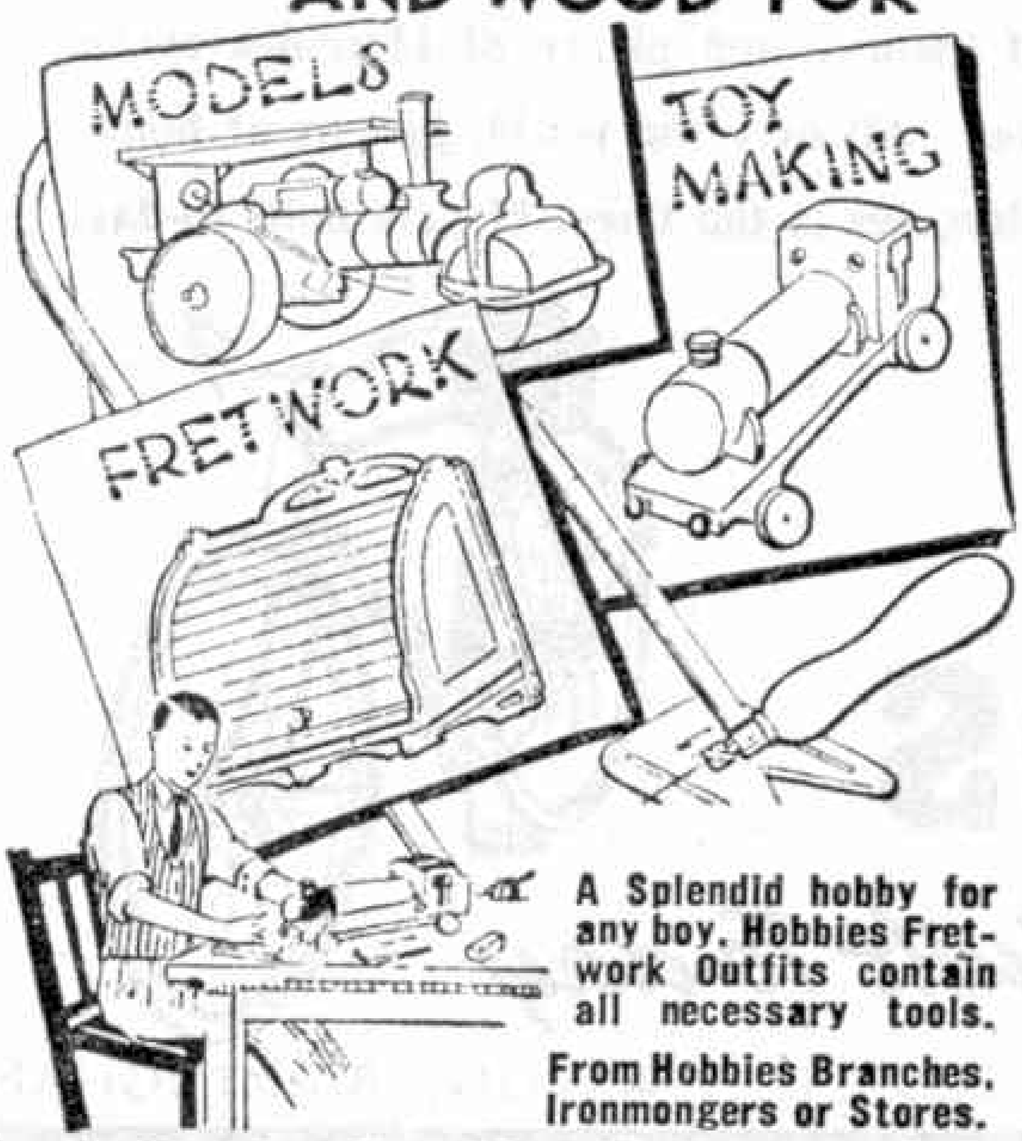

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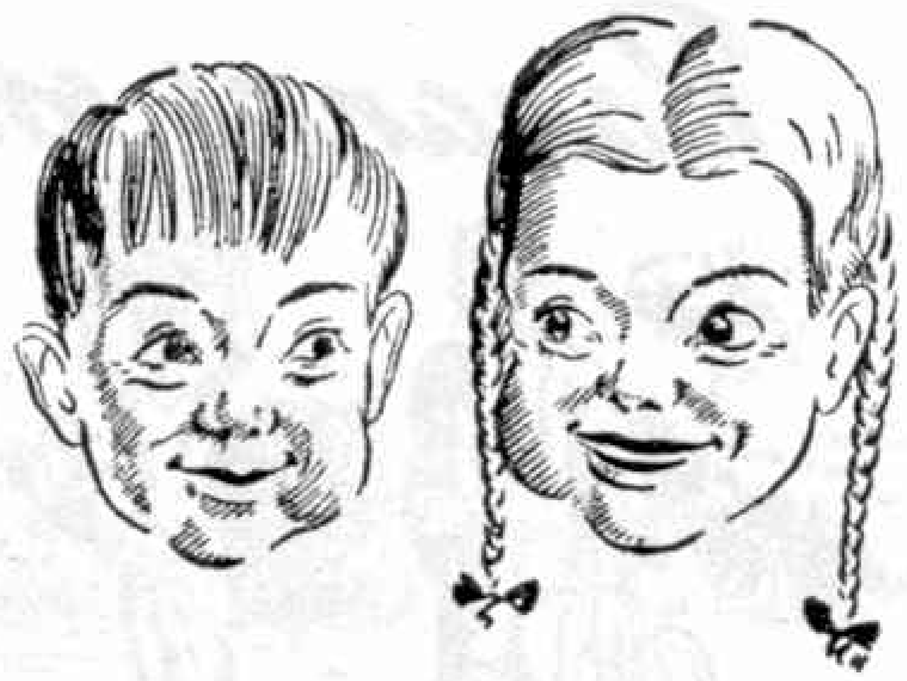

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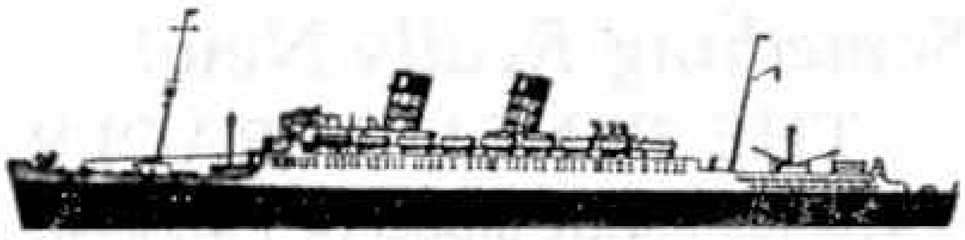

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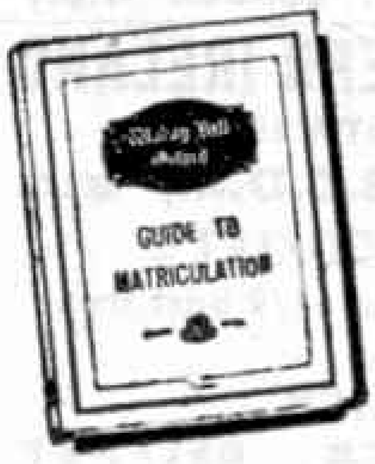

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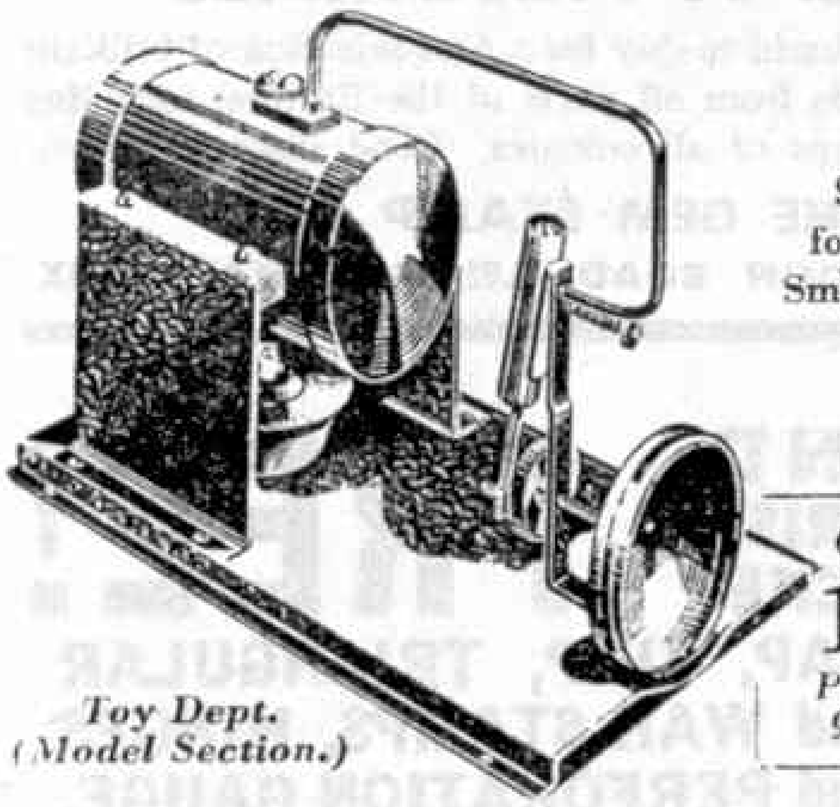

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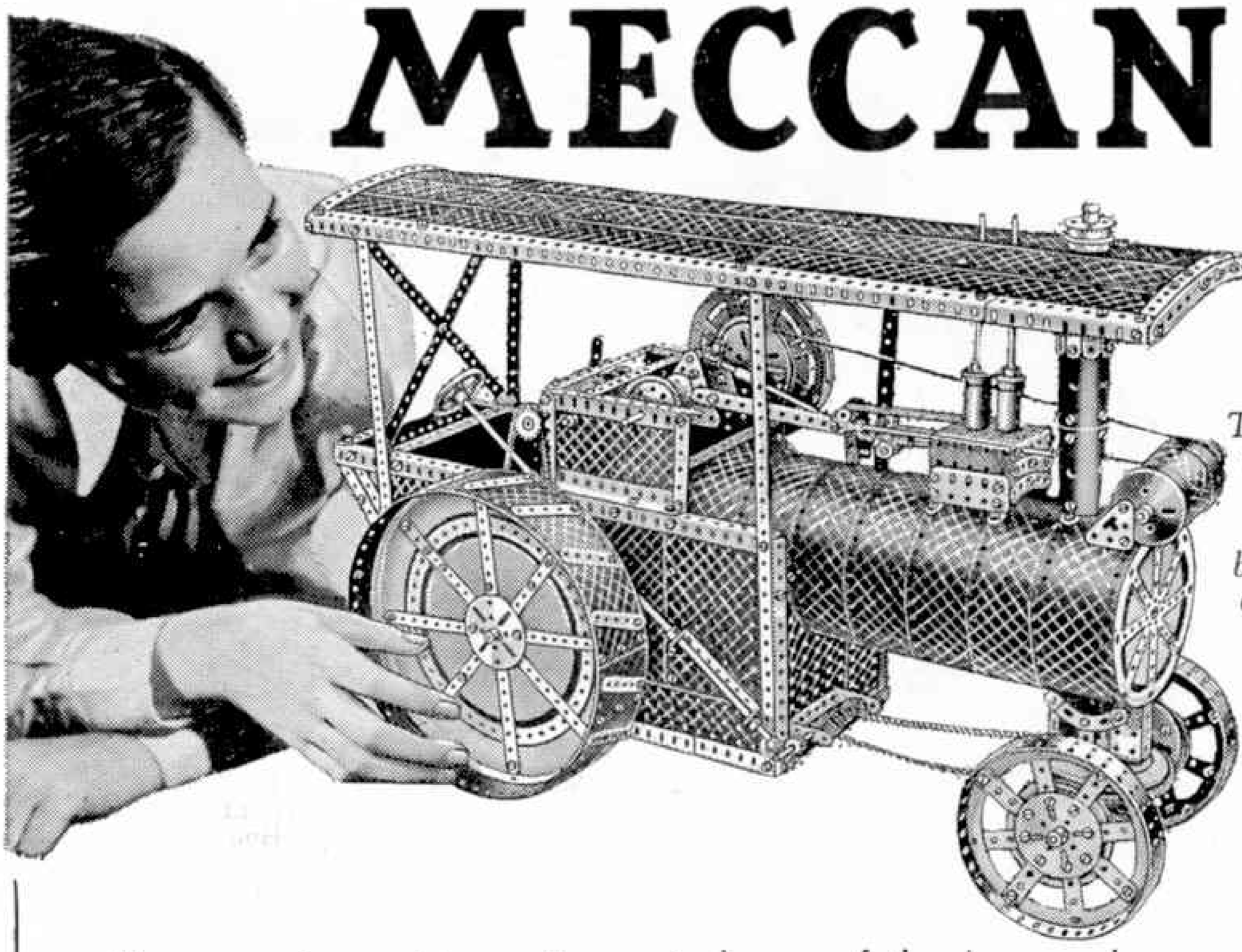

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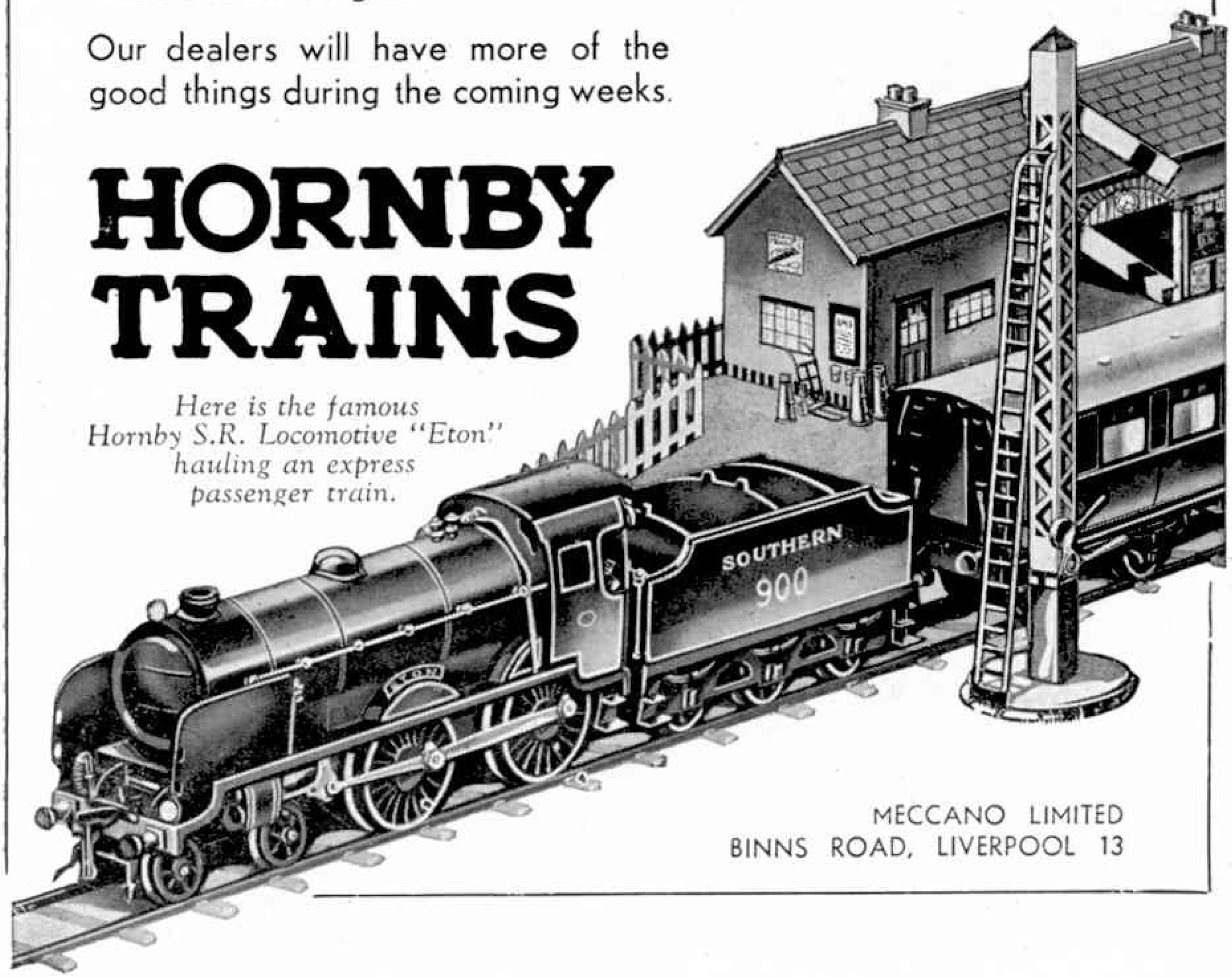

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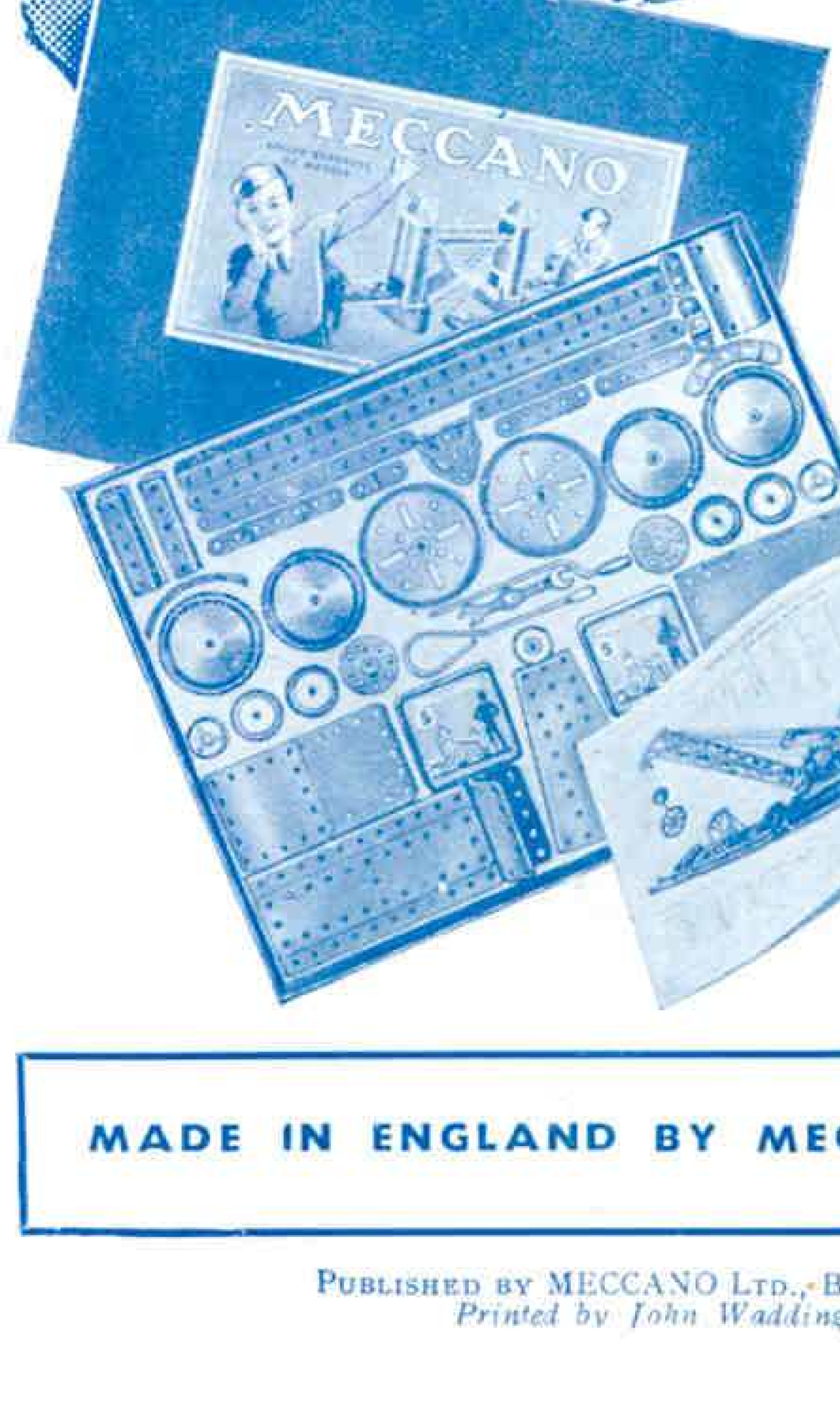

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